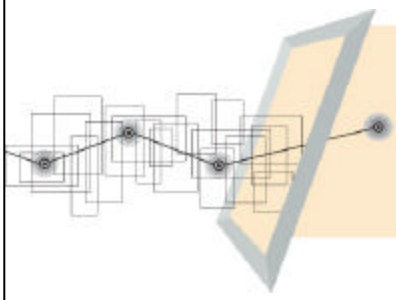
APPENDIX A

ECM: Content Process and Connectivity – Executive Overview



ECM: Content, Process and Connectivity

White Paper
January 2003

Executive Overview

Introduction

This document is intended for corporate decision makers responsible for determining the organization's enterprise content management (ECM) solution. This white paper proposes specific ways in which FileNet can solve an enterprise's content management problems through an integrated solution combining content, process and connectivity. Anyone involved with the ECM decision should benefit from the guidance provided in this paper.

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Executive Summary

This white paper explains how the FileNet P8 architecture solves an organization's burgeoning content management needs. FileNet P8 architecture provides the industry's broadest set of integrated ECM capabilities by uniquely combining content, process and connectivity to solve real-world business problems. FileNet delivers its ECM solution by way of a complementary set of products - Business Process Manager, Content Manager, Web Content Manager and Image Manager. Because each of these products is built on a common architecture, FileNet's strategy allows customers to begin with any one or a combination of these and add capabilities as needed, thereby providing flexibility and low total cost of ownership.

The FileNet P8 architecture is based on an open, standards based architecture that leverages industry standards like J2EE and XML for an open enterprise architecture that

protects investment and provides the flexibility to integrate with other infrastructures and application technologies as needed.

Each enterprise has unique ECM needs. Cognizant of that, this paper does not recommend a lengthy list of "required" ECM features and functions. Instead, the paper focuses on three benchmark capabilities that meet immediate ECM needs as well as provide a solid foundation for future growth and enhancement. More importantly, the tight integration among these capabilities is a key strength of FileNet's comprehensive ECM solution. Some of the principal benefits that these integrated components provide the enterprise are:

Content

- Managing the content lifecycle, from creation to publication to archive
- Supporting timely decision-making throughout an organization
- Streamlining document workflows and content publishing cycle times
- Making the most relevant information available wherever and whenever needed

Process

- Increasing agility and accelerating responsiveness to business events
- Optimizing operational efficiency and resource utilization
- Enforcing corporate standards and improving process consistency
- Shortening process cycle times while enabling better decisions
- Reducing complexity of integrating people, processes and existing systems

Connectivity

- Including data and content from any internal or external system
- Incorporating all relevant data into an enterprise's critical business processes
- Accelerating the speed at which decisions are made
- Significantly improving the overall quality of those business decisions

These integrated capabilities enable enterprise synergy so that: structured or unstructured content can be included in any aspect of a business process; business processes can manage the creation, modification and distribution of content; and process and content can interact with the various applications, systems and databases critical to corporate decision making. This unique integration removes the established boundaries that so often

isolate corporate content, business processes and system integration and prevent these resources from achieving their full business potential.

The FileNet P8 architecture is an evolution of FileNet's market leading content and process products, each invested with hundreds of millions of dollars of research and development over two decades. FileNet's depth and breadth of business experience in providing content and process solutions to more than 3,800 customers during the past twenty years is the foundation for its ECM solution.

FileNet offers a unique combination of strong content and process technologies enriched with connectivity capabilities that allow content and process to drive and respond to key business activities. No other vendor offers such a well-established and well-integrated architecture across all three areas. With this in mind, FileNet suggests you use content, process and connectivity as the benchmark for comparison, and continually ask, "how well do alternate solutions allow you to leverage critical corporate content, manage key business processes and connect with core business systems to achieve maximum business benefit?" while conducting your evaluation of ECM vendors.

Developing Your ECM Strategy

Developing an enterprise content management strategy is one of today's most important business decisions. The ease of creating and accessing content has been greatly accelerated by numerous desktop tools that allow almost anyone in an organization to create critical corporate content, and through web access to internal and external information sources. The explosion of content fostered by these technologies requires organizations to adopt better solutions to effectively manage burgeoning content – myriad content types, multiple sources of content, integrations with internal and external systems – and the business processes inherent in the creation and distribution of content.

Content management solutions must be more than a static repository for corporate documents. A true ECM solution should offer a synergy between content and business processes, allowing process to drive the lifecycle of a document, including detailed auditing to meet contemporary compliance requirements, and including relevant content and data resources in critical business processes.

Each organization has unique requirements for managing enterprise content, and those needs guide its choice of an enterprise content management vendor. There are core capabilities that any organization should consider when selecting an ECM vendor. Those core capabilities derive from a well-designed architecture, the degree of integration among the components of the ECM solution and the breadth and depth of capabilities offered across those components.

FileNet provides the broadest and deepest ECM architecture available in the market. The FileNet P8 architecture offers Global 2000 customers solutions for managing content and business processes while connecting these assets with applications and legacy systems

across the enterprise. The FileNet P8 architecture addresses the need for Web Asset Management, Records Management, Rich Media Management, Virtual Content Management, on-going Portal Integration, and Business Analytics and advanced Process Management, delivered in a broad, unified ECM architecture.

Architecture Guided by Two Decades of Experience

The strength of an ECM solution begins with architecture that has been influenced by 20 years of software development and customer solution experience. It is important to note that the FileNet P8 architecture is not a "brand new" product. Rather, it is the logical and focused evolution of FileNet's content and process products, each market leaders, invested with thousands of developer-years, refined and delivered as an integrated solution with a strong focus on ease of use, breadth and depth of functionality and rich connectivity.

ECM Foundation – Fully Integrated Content, Process and Connectivity

Unlike vendors who propose a lengthy list of granular features describing the requirements of enterprise content management, FileNet asserts that content, process and connectivity are the foundation of an ECM solution. In the FileNet P8, each of these individual components offers solid capabilities in and of itself. However, the unique advantage of the FileNet ECM solution is the synergy obtained from the interaction among these components and the resultant ability to integrate content and process into all aspects of an organization's business via a rich connectivity framework.

At the highest level of comparison, an ECM vendor should be evaluated on the breadth and depth of its content, process and connectivity capabilities. A further level of analysis should assess the level of integration among these three components.

Event-Driven Architecture Provides Enterprise Responsiveness

FileNet P8's "event-driven architecture" allows companies to immediately respond to customer demands and system events. This unique capability can increase organizational and customer responsiveness by making structured and unstructured content an active, "intelligent" part of business processes. Underlying the "event driven architecture" are eight capabilities that combine content, process, and connectivity to provide a responsive application infrastructure. Each one of these alone provides business benefits, but it is the combination of all eight that enable the synergy and business benefits of FileNet's "event-driven architecture."

INTERNET CONNECTIVITY extends an organization's reach through the Internet and ensures global connectivity. It enables a company to transparently and cost-effectively collaborate with external customers, independent agents, and multiple suppliers. This

connectivity extends the reach of business relationships to include all business partners in an extended enterprise.

The combination of **BUSINESS DOCUMENTS and PROCESS MANAGEMENT** enables inter-enterprise business processes. Customers, brokers, business partners, and employees can readily access, share, and exchange common business documents by means of predefined business processes. FileNet's "event-driven architecture" enables effective decisions by allowing people to interact with relevant business documents that are automatically delivered in the support of their business activities.

BUSINESS RULES enable standard operating procedures and ensure regulatory compliance by providing a formal approach to defining, managing and revising the business rules that drive an enterprise. Business rules can automatically and dynamically direct the flow of content from one task to another or enforce procedures based on predetermined criteria. Querying existing enterprise applications and incorporating results into these ongoing processes can dynamically drive business rules. Additionally, an organization can use a combination of business rules and knowledge worker expertise to optimize any decision process.

CONTENT PROPERTIES and their ASSOCIATED ATTRIBUTES categorize the content of business documents in a structured fashion. As a result, the business rules that define business processes can monitor identified properties for specific attribute values or attribute changes to create triggering events. In this manner the content properties play a dynamic role in determining when and how processes are ultimately triggered.

EVENTS and TRIGGERS can be used to initiate particular courses of action for business processes. Because the FileNet P8 architecture can monitor system events and triggers, business content and its metadata, as well as enterprise applications and external actions can be utilized to trigger particular events, which, in turn, launch predetermined business processes. Formalization of events and their resultant processes provides greater control over business processes that may otherwise be randomly or inefficiently managed.

LIFECYCLES define the existence and purpose of a document, from initial draft through final disposition. Because the lifecycle of a document and business processes that utilize the document are mutually influential, a company can organize activities as phases of a document or transaction lifecycle, with each phase having a beginning, middle, and an end. These separate phases have defined events and triggers that initiate individual business processes based on their unique circumstances or changes to data. Associating documents with formally defined lifecycles provides control of all phases of a document's existence and can track the document activities for compliance purposes.

PROCESS DEFINITIONS provide the ability to break large business processes into smaller, more manageable tasks. A lifecycle has self-contained business processes that define critical steps toward achieving a task. These process definitions represent discrete sets of tasks, based on particular transactions, circumstances or business events. The

process definitions identify the individual tasks that an organization can flexibly combine to accommodate different business situations.

SECURITY and PRIVACY – The FileNet P8 architecture relies on a secure network environment and object-level access rights and privileges that ensure the appropriate security (and hence the privacy) of individual information objects. At each step of a business process or phase of a lifecycle, there may be only a limited set of people who can view or act on the content – such as a partner, project manager or content consumer. Thus the security and privacy rights associated with content automatically change depending on the business context. The combination of security, lifecycle and process management ensures content is securely managed and accessed in a manner that meets compliance requirements.

The integrated combination of these eight capabilities produces an important end result – FileNet's "Active Content" which creates a responsive ECM application development environment for linking content, process and connectivity to deliver substantial competitive advantage in a cost-effective manner.

Multiple Dimensions of Scalability

Enterprise requirements demand enterprise capable architecture. The FileNet P8 architecture supports enterprise-level scalability with a multi-tier, distributed architecture that provides scalability in multiple dimensions – vertical and horizontal processing as well as unlimited content storage capability.

The FileNet P8 architecture provides vertical scalability to run the software in a single server with the ability to add system resources to increase system performance. Systems designed to support a vertical scalability approach gain performance improvements with the addition of memory and processors to the server on which they execute. For example, multiple instances of the application server can be run on a single machine.

The FileNet P8 architecture provides horizontal scalability to distribute the workload across multiple servers by clustering or load balancing. Web and application servers can be farmed to support large numbers of users. Multiple content repositories can be distributed across databases and machines, allowing the same system to service multiple applications. Services that access a content repository can be distributed across any number of machines to handle heavy user access. Horizontal scalability allows customers to add or remove servers to increase or decrease capacity, maintaining acceptable performance.

Additionally, several FileNet P8 applications leverage the J2EE application model to build multi-tier applications that deliver the scalability, accessibility, and manageability required by enterprise applications. For example, the Web Content Manager application leverages Enterprise Java Beans (EJBs) for scalability.

The FileNet P8 architecture enables massive volumes of content to be rapidly ingested, processed and stored. As an organization's storage needs grow, FileNet provides several high-volume content storage options, including EMC Centera®, to easily manage your growing content demands using the most appropriate storage technologies.

Details of FileNet's architecture, performance and scalability are available in several technical white papers that can be obtained from your FileNet account team.

Leveraging Industry Standards

Java, J2EE, HTML, XML, XSLT, SOAP, HTTP, FTP and .NET are among the many industry standards FileNet supports to provide an "open system." Many vendors in the industry support a combination of these standards, but FileNet believes it is important to explain why specific standards are particularly important and how FileNet has leveraged these standards.

Pervasive XML Support

XML is one of the most promising industry standards. FileNet utilizes XML in the content, process and connectivity components of its ECM solution. The FileNet P8 architecture is infused with XML capabilities. Some of the most significant examples of XML support include:

- Native validation, categorization and storage of XML
- XML tags can indexed and full-text searched
- Translation of content into XML format
- Import and export objects and metadata definitions
- Capture and storage of data in XML format via electronic forms
- Workflow definitions stored in XML format
- Structures represented in XML, including entry templates, search template, publish templates, publishing assemblies, import/export format, and site/user preferences
- Programmatic interfaces return XML than can be used to integrate with enterprise applications
- XSL transforms applied to XML to render user interfaces

FileNet is one of the few workflow vendors that stores workflow definitions in XML. Consequently, an enterprise's XML workflow definitions are stored and versioned in the same content repository that manages other corporate content. Many vendors, because of the limited investment in workflow, still rely upon proprietary workflow definitions that

are stored separate from the content they manage. This approach undermines the openness of their architecture and severely limits the integration of workflow with enterprise content.

FileNet's sustained level of investment in its workflow and the market is demonstrated by its continued leadership in the Workflow Management Coalition (WfMC). FileNet is a founding member of the Workflow Management Coalition standards organization and has continually had representation on the board of directors since founding. There are relatively few members of the WfMC who have this length of sustained leadership in the industry.

J2EE Provides Platform Independence

FileNet uses the J2EE standard to achieve platform independence, scalability and ease of deployment. The J2EE standard offers platform independence for business applications, quick deployment of enterprise-wide applications, APIs for applications development across various environments and support of highly scalable hardware platforms. FileNet's pervasive support of J2EE includes:

- J2EE certification on BEA WebLogic and IBM WebSphere application servers
- Java Server Pages (JSPs) and servlets used to service Web user requests and render Web pages dynamically
- Browser based client application, uses JSPs and servlets and runs in the J2EE application server
- FileNet P8 Web Content Manager is written in Java and provides a set of services as Enterprise Java Beans
- FileNet P8 Web Content Manager runs in the J2EE application server
- Java APIs provide a programmatic interface to FileNet P8 architecture for Java development
- Integration Engine supports Java Database Connectivity (JDBC) that allows for interfacing to databases
- Java Connector Architecture allows for interfacing with packaged applications and legacy systems

Broadest Spectrum of Content Management

The FileNet P8 architecture was designed to capture, manage and distribute a wide variety of critical corporate content, including documents, web content, rich media assets, images, reports and records. There are common features and functions that support

processing of these content types. Requisite features such as check-in/out, multi-level versioning, renditioning, metadata classification, full text search, life cycle management, HTML and PDF renditioning, security and access control are offered by nearly all content management vendors. The FileNet P8 architecture provides these features and complements these basics with capabilities that provide a functionally richer and more versatile environment for managing a broad spectrum of content.

Uniform Architecture to Manage Critical Corporate Content

The fundamental purpose of any ECM initiative is to provide a single architecture to manage content of any type and allow the content repository to be a nexus for all sources of content, no matter the method or origin of content.

The FileNet P8 architecture provides a rich environment to facilitate creation and secure access of a wide range of content. Some of the key means in which the FileNet P8 architecture provides this broad support are:

- Integration with Microsoft Office menus allowing users to create and manage content entirely within the Office environment
- Template-based contribution of web content permitting subject mater experts to publish content effortlessly to a web site
- WebDAV support allowing any WebDAV compliant application to access the FileNet repository
- Native electronic forms for custom data capture and presentation. Electronic forms are already integrated with workflow and all electronic forms can be managed and versioned in the FileNet P8 repository
- Wizards and entry templates to guide and automate the most frequent user activities such as adding a document or launching an approval workflow
- Comprehensive support for fixed content – from ad-hoc to high-volume image capture – without the need to integrate 3rd party capture or viewing components
- Integration with SAP and Siebel systems allowing users to access critical corporate documents without leaving the SAP or Siebel environments
- An EAI framework that allows critical corporate data residing outside the of a content repository to be accessed and utilized in corporate business processes and decision making

FileNet further enhances content management by providing a uniform web interface to manage all user interactions including the contribution of content, searching, retrieval, viewing, workflow design and participation, workflow analytics and simulation, and web site management.

Native Records Management for Compliance

The contemporary business and government climate makes records management a critical component of any enterprise content management solution. FileNet has been providing the means to securely manage the entire lifecycle of critical corporate records for well more than a decade: system and data-level functionality to manage individual documents from initial acquisition through their final disposition as a document of record. Both government and industry, led by standards-driven approaches such as DoD 5015.2 certification, have pushed the demand for integrated, complete records management applications tightly coupled with content management systems. FileNet led the industry's recognition of this standard in executing the first 5015.2 "paired" certification content and electronic records management systems with the DoD Joint Interoperability Test Command in 1998.

As the industry evolved, FileNet moved toward and has now committed to an integral records management strategy in which complete, native records management functionality and applications are built directly within the FileNet software. While many content management vendors approach the records management issue through the acquisition of records management vendors, FileNet provides a native records management capability to complement its core ECM architecture and avoid the numerous problems associated with acquisition. Such problems can include architectural incompatibilities, protracted integration efforts between products, repeated integration efforts to support evolving releases of component products, duplication of repositories and incompatible interfaces. FileNet's solution avoids those problems by delivering a records management solution that is an organic component of the ECM environment and does not require the added overhead of an additional repository and expense of integration. FileNet is currently on the list at the Joint Interoperability Test Command to have our native Records Management offering certified for DoD 5015.2 in 2004.

FileNet also supports an enterprise's compliance initiatives with additional native capabilities. These features include: logging of content and process activities, security policies automatically applied to content, auditing of selected content and process activities, enterprise application integration and permanent, unalterable storage of content in its final form. In addition, FileNet also provides inherent ability in the software to support paradigms and products enabling high availability, disaster recovery and business continuity. FileNet has a long and proven track record of success in supporting enterprise disaster recovery plans within the most visible and devastating natural and other disasters that have faced businesses in the last twenty years. Together, all of these capabilities provide a strong foundation for meeting enterprise compliance requirements

Superior Architecture for Fixed Content

Despite the best intentions to achieve the paperless society, paper remains a common medium of communication and transaction. Capture and storage of paper-originated content (also called fixed or image content) remains an important part of an ECM strategy.

Some vendors address this ECM requirement through a combination of partnerships with capture and storage vendors and an attempt to "stretch" a document management repository to manage large volumes of fixed content. Such a solution may be suitable for

small volumes of images or images that contain only a few pages. However, when organizations have one or more of the following requirements...

- Time-sensitive processing of large volumes of image documents
- Large volumes of images with predictably high-rates of retrieval
- Multi-paged image documents that need instantaneous, optimized retrieval
- Completely integrated image solution – capture through hierarchical storage – from a single vendor

... the shortcomings of a document management architecture masquerading as a scalable image management solution become apparent. Performance, scalability and responsiveness falter because the underlying architecture is not designed or optimized for large fixed content applications.

FileNet is unique in its ability to manage fixed content. FileNet provides P8 Image Manager that easily meets all of the scalability and performance requirements of large volume fixed content management. FileNet is the only ECM vendor that is a sole provider of a seamlessly integrated and comprehensive fixed content solution that includes capture, indexing, viewing and annotation, optimized storage (caching, replication, contiguous storage of files), optimized retrieval (pre-fetching and streaming) and a range of hierarchical storage options including optical (write-once and rewrite), disk and EMC Centera®. During the past 20 years FileNet has established an enviable reputation for fixed content management with hundreds of customers managing billions of documents.

When comparing fixed content solutions from other vendors consider:

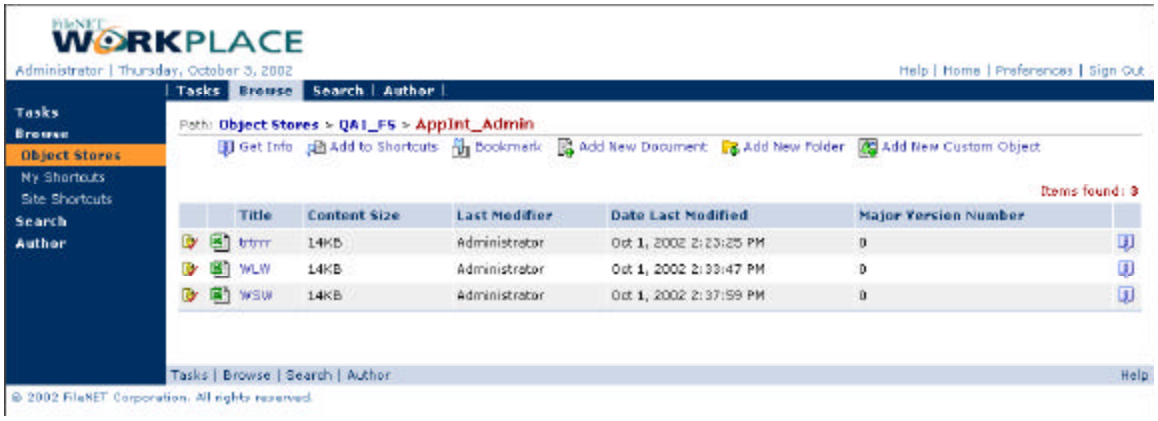
- Does the vendor provide a complete fixed content solution or are numerous components from 3rd party vendors required for the solution? If components are required, what is the added cost of licensing, installation and on-going support?
- Is the solution scalable? Can the vendor show performance metrics for its capture rates, throughput, retrieval rates and storage volumes?
- Does the vendor optimize all facets of fixed content management (capture, storage and retrieval) or does it ignore the special requirements of fixed content by treating it as "just another" file type?

Depending upon your specific fixed content management requirements, an ECM vendor that cannot meet one or more of the above criteria may be offering a "solution" that is needlessly complex or inadequate for your fixed content requirements.

P8 Workplace Provides Superior Ease of Use

The FileNet P8 architecture places major emphasis on ease of use. FileNet invested heavily in ease of use because it is the primary key to improving user productivity. This is in stark contrast to vendors who require multiple interfaces for document management, web content management, or workflow, or require third party products to meet the needs of document viewing, business process management or document capture. The benefits are immediately apparent as soon as you interact with P8 Workplace. Because of its consistency, FileNet's single web interface is easier to install, easier to learn and easier to manage across the enterprise.

FileNet did not compromise ease of use by attempting to carry forward components and metaphors from earlier disparate interfaces. Strategically, FileNet developed a single, consistent interface tailored to the needs of document, Web content and business process management, thus eliminating the complexity of multiple user interfaces and the overhead of deploying and managing multiple interfaces. Wizards and entry templates further enhance ease of use by guiding users in the creation and management of content and participation in workflow. Users can easily customize more than 30 preferences and an additional 40+ site preferences can be defined without need of programming to further enhance the user experience.



FileNet P8 Workplace User Interface

Synergy of Integrated Content and Business Processes

Processes that manage the creation, review, delivery and final disposition of content are as critical to content quality as the subject matter experts who develop the content. Consequently, an ECM solution should be equally rich in content management and process management.

ECM vendors rooted in the document management market offer very limited business process management. Typically the workflow is sufficient to manage the creation, review, approval and distribution of content stored in a repository or published to a web site. However workflow designed solely for the management of content creation cannot be utilized for more demanding and sophisticated workflow needs in an organization because of the workflow's limited architecture. In such cases, third party process management tools must be acquired to manage more sophisticated and extensive enterprise processes.

The FileNet P8 architecture provides an integrated process management architecture that manages not only the creation and distribution of content, but extends well beyond to manage the most sophisticated, integration-intensive, high-volume enterprise business processes. No other ECM vendor offers the full spectrum of process management capabilities so tightly integrated with a solid content management platform.

Web Based Deployment Provides Lower TCO

FileNet's Java process management architecture is entirely web-based. Workflow design is done graphically; participation takes place via a web interface (which can be further enhanced by customized electronic forms); real-time tracking is accomplished via the same web interface; and post-facto workflow analytics are also provided via the web. The consistency of interface and ease of use features result in rapid deployment and adoption of FileNet P8 Business Process Manager and add to P8's overall lower total cost of ownership, in comparison to vendors whose business process management solutions are composed of disparate components with inconsistent interfaces.

Process Analytics and Simulation Accelerate ROI

Organizations gain tremendous control over their business processes by formally defining them and managing their execution with a business process management environment. Critical business processes can be significantly improved through an analysis of current business processes.

FileNet's business process management environment enables an organization to record detailed data about the timing and execution of business processes. Process data can then be analyzed and displayed graphically to determine the efficiency (or inefficiency) of the process. Processes exhibiting any inefficiency can then be refined to eliminate the inefficiency. The FileNet P8 architecture can also display real-time process performance data to provide an instantaneous window into the currently running process.

Additionally, inefficient business processes can be refined through FileNet's native simulation that allows analytical data obtained from current processes to be used as baseline data for process performance. Various parameters can then be modified (duration of task, number of operations in the process, number of persons executing a task in parallel, etc.) to determine the sequence of tasks, number of resources applied to task, or timing of tasks that leads to the optimum process efficiency.

FileNet's business process analytics and simulation is unique because it was designed as a fully integrated capability of the FileNet P8 architecture and is accessed through a web interface. This native simulation approach is in stark contrast to vendors whose approach to providing analytics and simulation is via integration or acquisition of previous generation analytics technology. Such technology is overly complex because the stand-alone analytic vendors attempted to be "all things to all people" in order to improve their chance of being OEM'd by as many workflow vendors as possible. In an attempt to be widely used, these products are laden with many superfluous features and are not optimally integrated with any workflow vendor's product.

FileNet's approach to business process analytics and simulation can be summarized as "native capability optimally designed for, and integrated into the FileNet business process management environment."

Business Rules Dynamically Control Business Processes

Every enterprise depends upon hundreds, if not thousands, of implicit and explicit business rules to keep the organization's business processes running smoothly. However, the formal codification and management of these rules is a formidable challenge. The FileNet P8 architecture enables an organization to encapsulate the business logic in a rules engine and utilize these rules and logic in the execution of business processes. Business process routing can then be dynamically controlled based upon interaction with the rules engine.

The rules engine allows an organization to incorporate and change the business process rules by way of an easy-to-use, natural language business rules interface. Separating business rules from the business processes that they control enables the individuals directly responsible for developing and managing the business rules to create and modify the business rules without requiring technical programming experience.

The FileNet P8 architecture also allows the rules engine to modify values in fields that are associated with a business process. This interaction between business processes and business rules is another factor that enables FileNet P8's "active content" allowing an enterprise to be exceptionally responsive to employee, partner, and customer business demands.

Process Facilitates Compliance

Entire workflow processes can be tracked to the required level of detail for auditing and compliance purposes. Auditing statistics can be used for real-time analysis of the processes, post-facto assessment of process performance or even as the basis for simulating alternative processes to achieve greater process optimization.

Electronic Forms Complement Process and Content

Process management provides the additional benefits of native electronic forms management. Electronic forms provide a way to create custom forms to capture and present data during the individual workflow tasks. Content captured via electronic forms can be stored in an XML format for later access or transformation into other data formats. Electronic forms can also be used to create custom workflow interfaces. Because FileNet process capabilities are so tightly integrated with the content repository, any electronic form, as well as the data captured and managed by the electronic forms can be managed and versioned in the repository.

Rich Enterprise Data Connectivity

The third component of the FileNet ECM solution is connectivity. In addition to the connectivity to SAP and Siebel that many content vendors provide, FileNet adds an extra dimension of connectivity that makes it possible to integrate content and processes with any other data base, mainframe, application or system within or external to the organization. FileNet accomplishes this via an application integration framework that enables direct integration with FileNet's content and process functionality.

FileNet's native EAI capability reduces the cost of development and ownership for all applications requiring integration with legacy/line-of-business applications. All of FileNet's ECM products have been designed to work with existing mission-critical applications and integrate with legacy systems using industry standard tools and techniques, extending the life and value of existing IT investments.

Collaboration Complements Leading Environments

The definition of collaboration can be as broad as the definition of enterprise content management with each individual or organization offering a different definition of the term. FileNet takes a very focused view of collaboration, with a strategy of complementing the broadly used collaborative environment of Outlook and widely used collaboration services such as WebEx. FileNet complements the capabilities of these environments with its own collaborative strengths.

FileNet's native collaborative capabilities include:

- Integration with Outlook allowing content to be accessed within the Outlook environment
- Hierarchical structuring of content to mirror the project management requirements

- Content security that guarantees only project members to have appropriate levels of access to project-related content
- User-defined collaborative workflows, real-time tracking (including deadlines, milestones and escalation) and reporting of workflow activities
- Out of the box content approval workflow
- Saved searches created for exclusive use of a project team
- User notification of changes to group or project content

FileNet further enhances the collaborative environment by enabling access to the many data sources located throughout the enterprise. FileNet's native enterprise application integration capabilities allow individuals, groups and processes to access the wide range of content and data that may reside in multiple systems or databases internal and external to the organization.

Conclusions

FileNet Enterprise Content Management solution solves a wide range of contemporary content management problems. In particular the FileNet P8 architecture solves the ECM problem via three benchmark capabilities – content, process and connectivity – with an emphasis on the business benefits provided by the unique integration of these capabilities. This tight integration removes the established boundaries that so often isolate corporate content, business processes and system integration and prevent these resources from achieving their full business potential.

FileNet is unique in offering the combination of strong content and process technologies enriched with connectivity capabilities that allow content and process to drive key business activities and decisions. No other vendor offers such a well-established and well-integrated architecture across all three areas.

FileNet Enterprise Content Management solutions are designed to give your company a competitive edge whenever there's a decision to be made. These solutions provide a flexible and scalable architecture for managing content; for automating, streamlining and analyzing business processes; and for facilitating collaboration, and simplifying decision-making across business divisions or around the world.

About FileNet

FileNet Corporation (NASDAQ: FILE) helps organizations make better decisions by managing the content and processes that drive their business. The FileNet P8 architecture allows customers to build and sustain competitive advantage by managing content throughout their organization, automating and streamlining their business processes, and

providing the full-spectrum of connectivity needed to simplify their critical and everyday decision-making.

Since our founding in 1982, more than 3,800 organizations, including 80 of the Fortune 100, have come to depend on FileNet solutions for help in managing their mission-critical content and processes.

Headquartered in Costa Mesa, California, FileNet markets its innovative solutions in more than 90 countries through its own global sales, professional services and support organizations, as well as through its ValueNet® Partner network of system integrators, value-added resellers, and application developers.

APPENDIX B

FileNet P8 Technical White Paper

FileNet P8 Technical White Paper

A Technical White Paper
January 2003

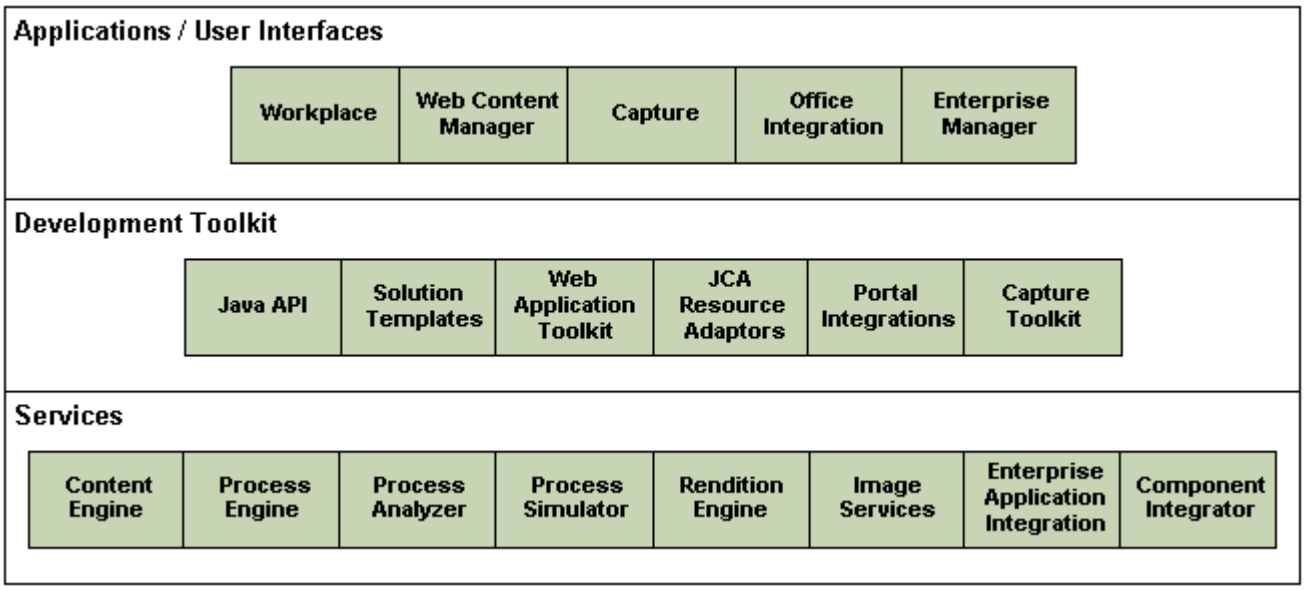
Introduction

FileNet Enterprise Content Management (ECM) solutions are designed to help companies and governments manage the content, processes and connectivity that define how decisions are made - by individuals, across project teams and departments. The FileNet P8 architecture provides a scalable and extensible platform for delivering enhanced content and process management across the enterprise.

This white paper provides a technical summary of the architecture and capabilities of the FileNet P8 components that make up the *Content Manager*, *Business Process Manager* and *Web Content Manager* solutions. The *Architecture* section of this document provides an overview of the system components and architecture. The *Features* section describes features and concepts in detail.

Architecture

The FileNet P8 family of products includes back-end services, development tools, and applications that address enterprise content, process, and connectivity requirements. The following diagram provides an overview of the FileNet P8 components. Each component shown in the diagram is introduced in more detail in this section, which serves as a summary of the capabilities provided. Additional details about features and concepts are presented in the *Features* section of this document.



Services

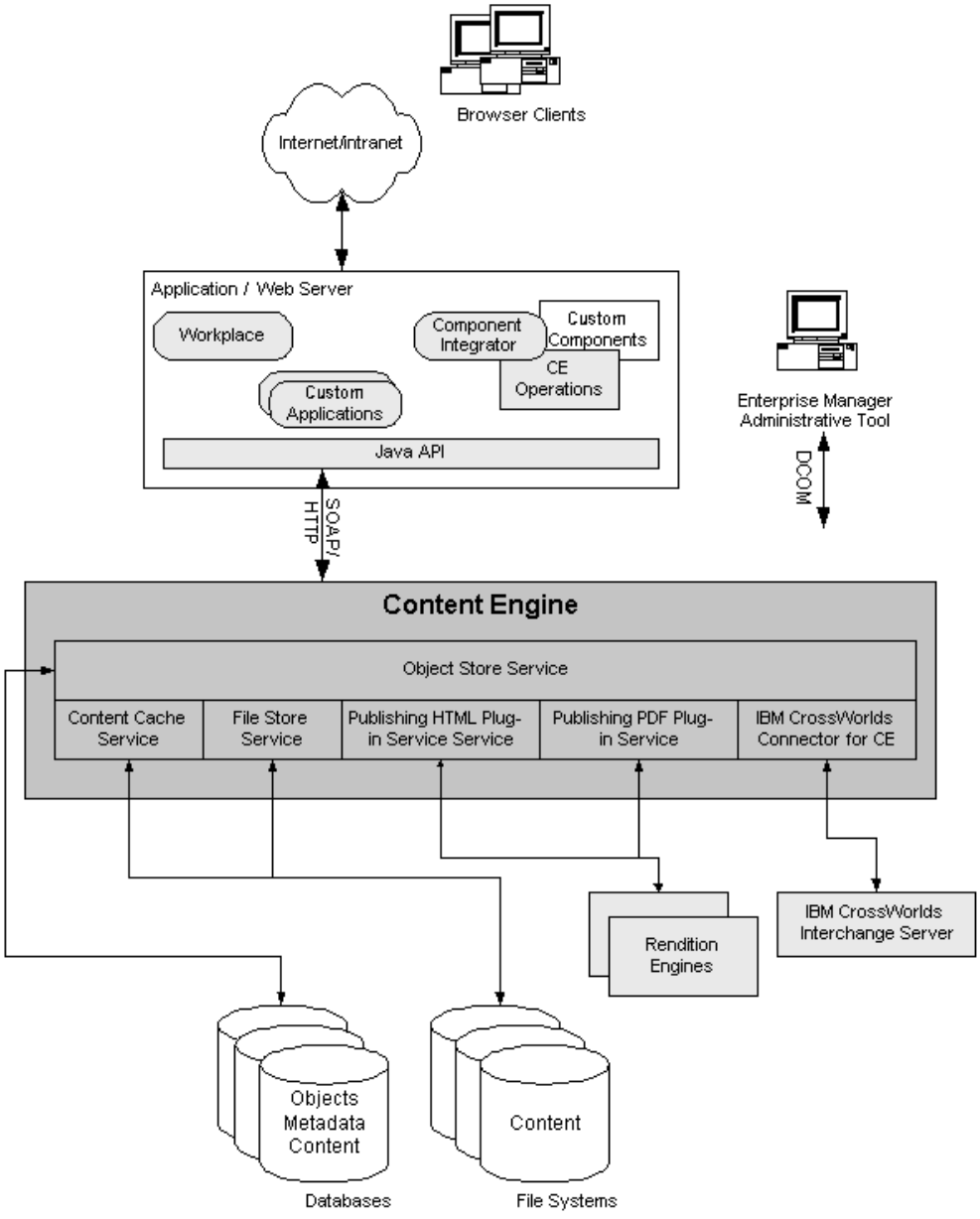
Content Engine

The Content Engine provides software services for managing content and other business-related data, collectively referred to as objects. In addition to managing documents and any customer defined objects, the Content Engine manages a broad range of enterprise content including workflow definitions, stored searches, publishing templates, entry templates, web content management templates, analytics reports, and simulation scenarios. Key services provided by the Content Engine include:

- Distributed repository services (object stores)
- Distributed content storage services
- Content retrieval and distributed caching services
- Object-oriented, extensible metadata model
- Version management
- Relationship management
- Security services that provide fine-grained object access control
- Server side events and subscriptions
- Content classification framework
- XML content classification
- Content transformation to PDF and HTML (i.e. renditions)
- Document lifecycle model

- Search services
- XML- based import and export
- WebDAV provider
- Integration services
- Administration

The following diagram provides a detailed view of the Content Engine architecture.



The services shown in the diagram are:

Object Store Service - Manages one or more object stores, handling database transactions, managing metadata and database-stored content for objects such as documents, folders, searches, workflow definitions. Also provides support for

full-text indexing, property search, content-based search, server events, automatic content classification and document lifecycles.

File Store Service - Manages one or more file stores for storing content. Also manages interaction with the Verity full text search engine.

Content Cache Service - If enabled, allows the system to retrieve content from remote file stores and cache it locally for later interactions.

Publishing PDF Plug-in Service - Manages requests to render documents into Adobe Acrobat PDF format. Submits format translation requests to Rendition Engines.

Publishing HTML Plug-in Service - Manages requests to render of documents into HTML format. Submits format translation requests to Rendition Engines.

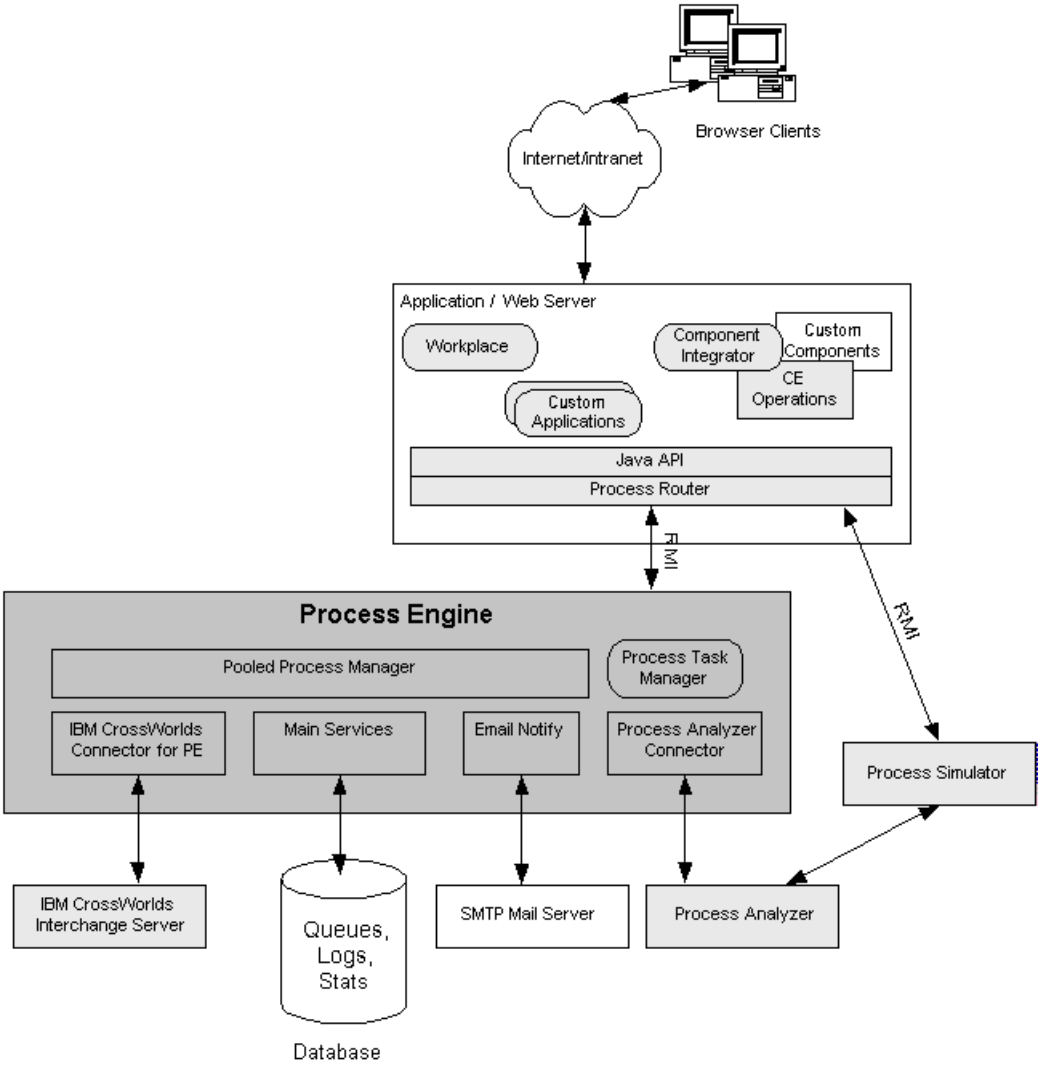
IBM CrossWorlds® Connector Service - Enables communications between Content Engine servers and the IBM CrossWorlds® InterChange server for Enterprise Application Integration.

Process Engine

The Process Engine provides business process management capabilities. Key services provided by the Process Engine include:

- Distributed process execution
- Isolated process regions
- Individual and group work management
- Routing
- Timers
- Email notification
- Event logging
- Authorization
- Statistics gathering for analysis
- Integration services
- Administration

The following diagram provides a detailed view of the Process Engine architecture.

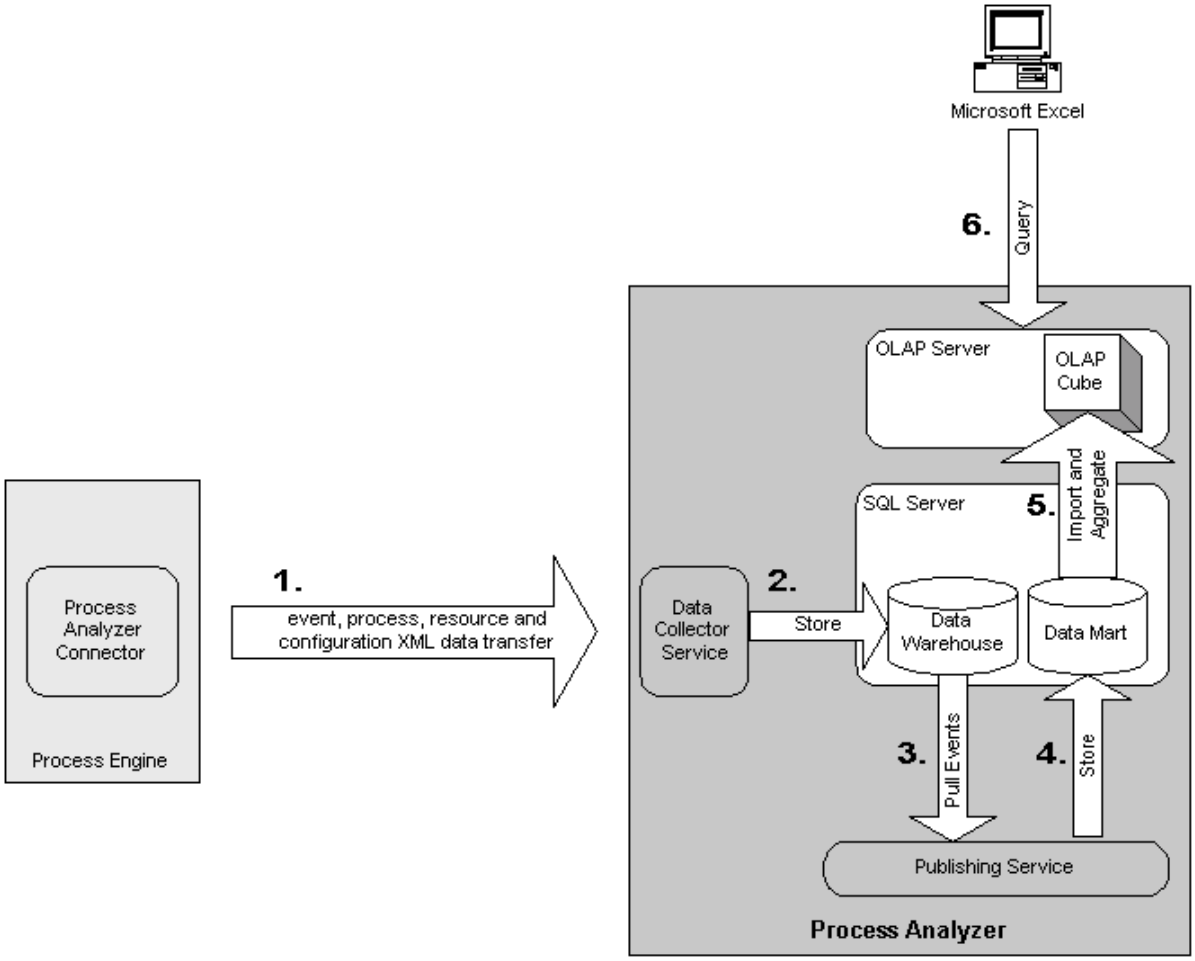


Process Analyzer

The Process Analyzer supports monitoring and analyzing business processes by collecting events from workflows running in the Process Engine and generating statistical data and reports. The Process Analyzer leverages OLAP (On-Line Analytical Processing) technology for fast analysis of multi-dimensional information, drill-down from summary view to details, and “slice and dice” for interactively exploring business process data from different perspectives.

The following diagram shows the architecture of the Process Analyzer and how data flows from the Process Engine to the Process Analyzer. The Process Analyzer Connector runs on the Process Engine, collecting information about process execution via events and passing these events plus information about the workflow definitions and configuration to the Data Collector, a Windows® 2000 Service that runs in the Process Analyzer.

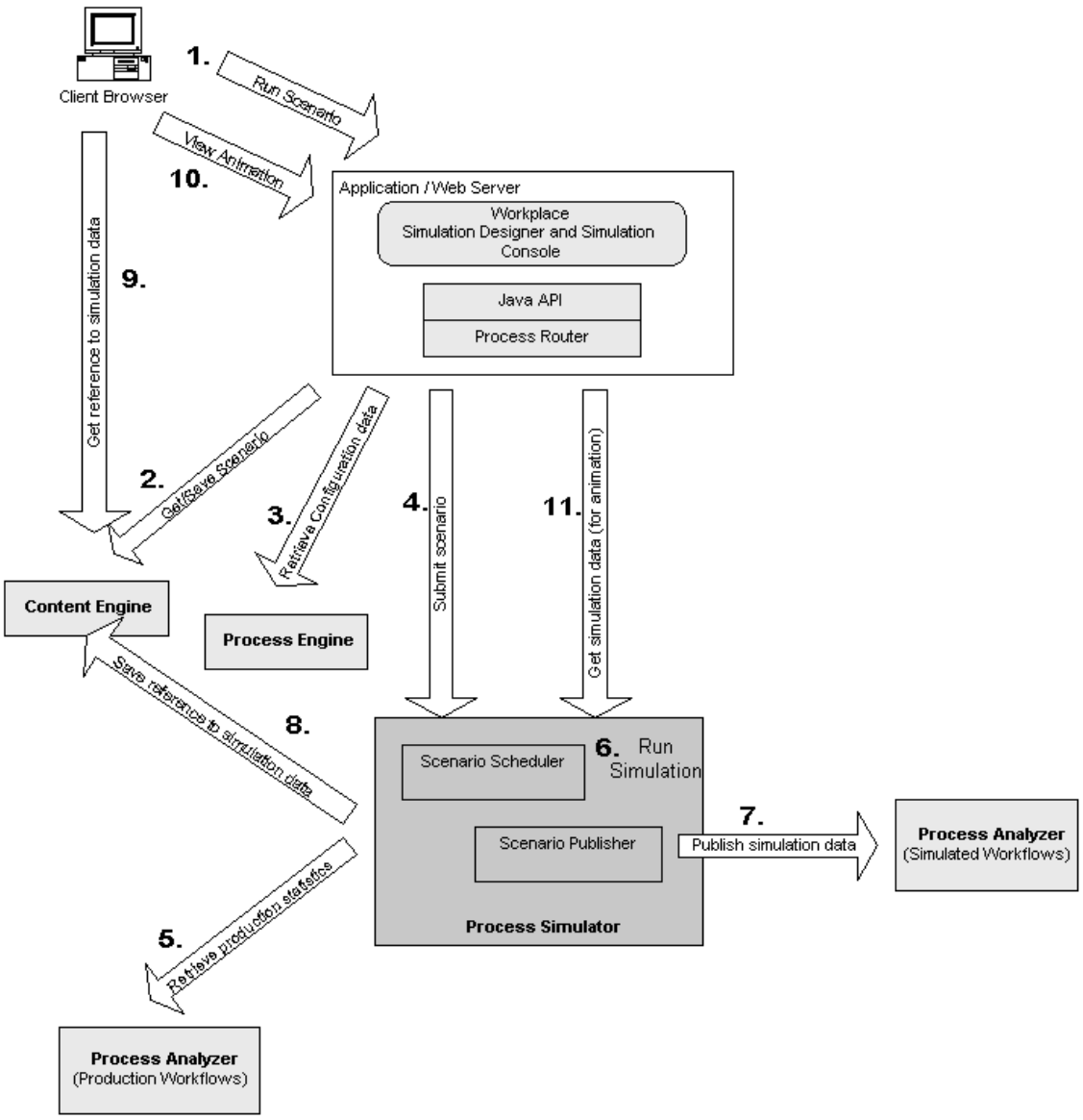
The Data Collector stores the information in the Data Warehouse and Data Mart. The Data Warehouse serves as a staging area for the Data Publisher, which analyzes events and uses the information to populate required information in the Data Mart. The Data Mart maintains raw statistical information which is used to build OLAP Cubes. Ultimately, the OLAP Cube provides the information required to generate Excel charts for the end user.



Process Simulator

The Process Simulator is responsible for performing “what-if” scenarios based on data gathered by the Process Analyzer, providing business analysts with important information that helps streamline business processes.

Simulations are performed by creating “scenarios” that define parameters of the simulation. The diagram below illustrates how a scenario is run and provides an overview of the Process Simulator architecture. An analyst using the Scenario Designer and Console in Workplace creates a scenario and requests that it be run. The scenario is saved to an object store via the Content Engine, allowing the scenario to be versioned and re-run as needed. The related configuration information for the workflow specified in the scenario is retrieved from the Process Engine. The scenario and configuration information is submitted to the Process Simulator as a simulation. The Process Simulator retrieves any statistics about the workflow that are stored in the Process Analyzer. The simulation is run. The simulation data is published to the Process Analyzer which is responsible for gathering simulation statistics. A simulation object is saved in the Content Engine object store. The simulation object references the simulation results that are stored in the Process Simulator. The analyst selects a simulation object from Workplace. The analyst requests to view an animation of the simulation and the simulation data is retrieved from the Process Simulator and is displayed to the user.



Rendition Engine

The Rendition Engine is responsible for converting documents from a variety of formats (such as Microsoft® Office) to PDF and HTML format. Multiple Rendition Engines can be configured to support large numbers of translation requests.

The diagram below shows how PDF and HTML renditions are created. An application requests that a transformation be performed by submitting a publish request. The publish request is queued by the system. The publishing plug-in service continually services these requests by getting the request and sending the format translation request to the Rendition Engine.

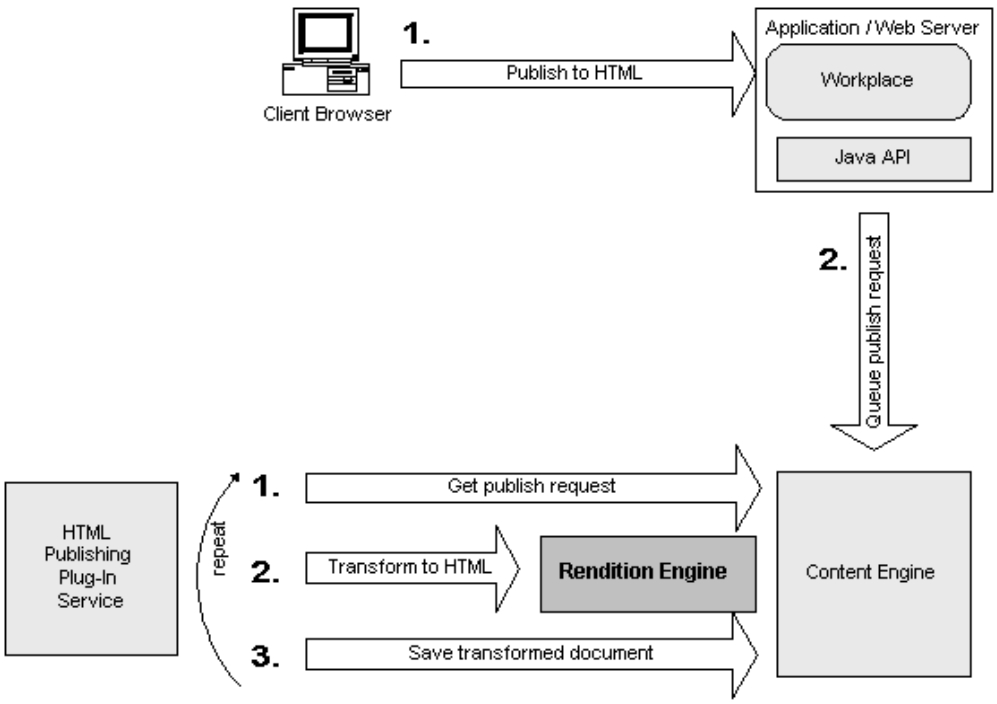


Image Services

Image Services provides very high volume image acquisition and storage capabilities. Capabilities provides in Image Services include:

- Batch entry and indexing for very high volume image acquisition in an assembly-line fashion.
- Hierarchical storage management and high-speed locator database.
- Distributed cache services.
- High-volume remote print services for images.

The Image Services integration section of this document describes how to integrate Image Services with other FileNet P8 components.

Enterprise Application Integration

FileNet provides Enterprise Application Integration connectors for integrating process and content with enterprise applications. In addition, FileNet offers an optional EAI server through an OEM agreement for IBM CrossWorlds® InterChange Server, Connectors, and Collaborations.

The connectors provided by FileNet provide easy integration with dozens of enterprise applications such as SAP R/3®, Siebel, and Clarify as well as technologies such as XML, Web Service, JMS, and MQSeries. The FileNet connectors support the following behavior.

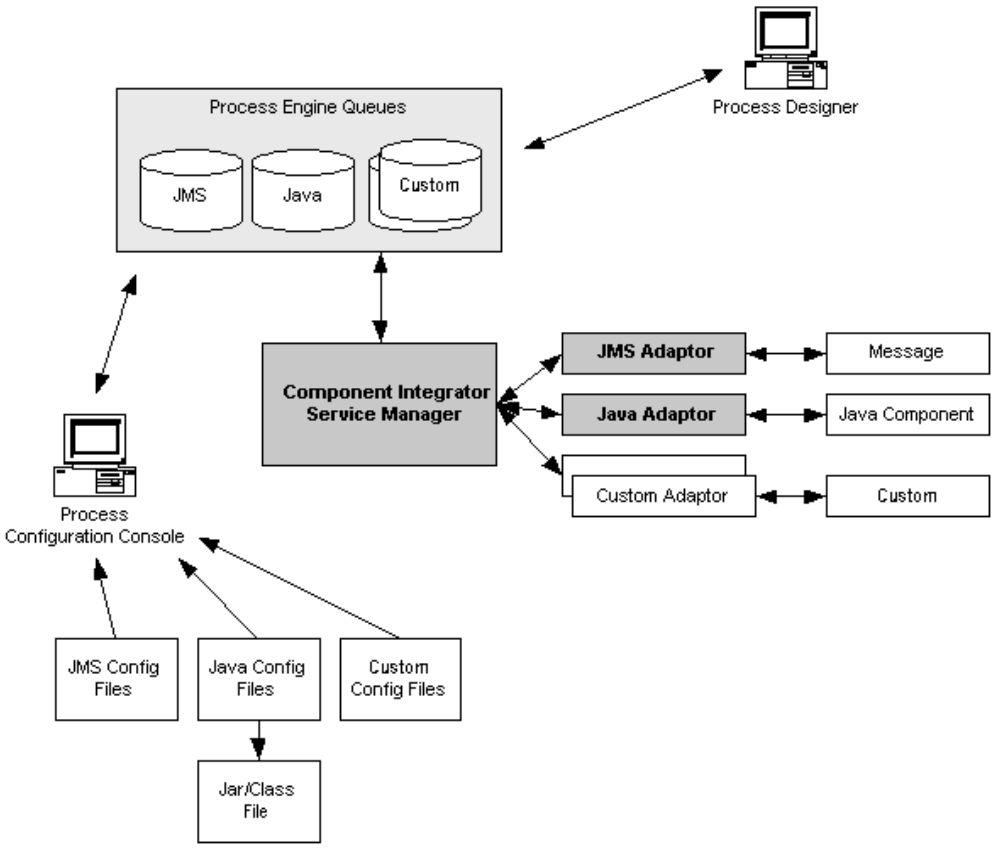
- Object, workflow and queue definitions can be exported from the Content and Process Engines for data mapping and specifying processing logic using the IBM CrossWorlds® graphical design tools.
- From a CrossWorlds collaboration, you can launch workflows, execute process operations and create, update, and delete documents, folders and custom objects.

- You can initiate a CrossWorlds collaboration from a workflow step or from a Content Engine event, such as when a new object is created or updated.

FileNet plans to provide connectors to other EAI vendors in the future, and customers and partners can use the FileNet P8 development tools to build additional connectors.

Component Integrator

The Component Integrator provides a mechanism for easily interacting with components (such as Java Classes) from a workflow. For example, a step in a workflow can call a Java component to request services from a 3rd party vendor. A workflow designer using the graphical Process Designer tool can invoke that Java class without programming. The following diagram illustrates this concept.



As shown in the diagram, adaptors provide the ability to interact with different types of components from a workflow step. FileNet provides a Java and JMS (Java™ Message Service) adaptor for calling Java components and interacting with message queues. Customers and integrators can write their own adaptors for interacting with other types of components or applications. Queues are created in the Process Engine to service the different types of adaptors. The Process Configuration Console tool is used to register the components. A user who creates workflows in the Process Designer creates a step and selects the component and the method to invoke, passing workflow fields as parameters to the method. When the process is executed, the Component Integrator Service Manager is responsible for retrieving the request from the component queues and invoking the components via the adaptors.

Applications

P8 Workplace

P8 Workplace is an out-of-the-box web application that is installed on a J2EE™ application server. Workplace serves several purposes: it can be used to perform typical document management functions, it provides tools for developing custom applications, and it provides a demonstration of the capabilities provided by the platform.

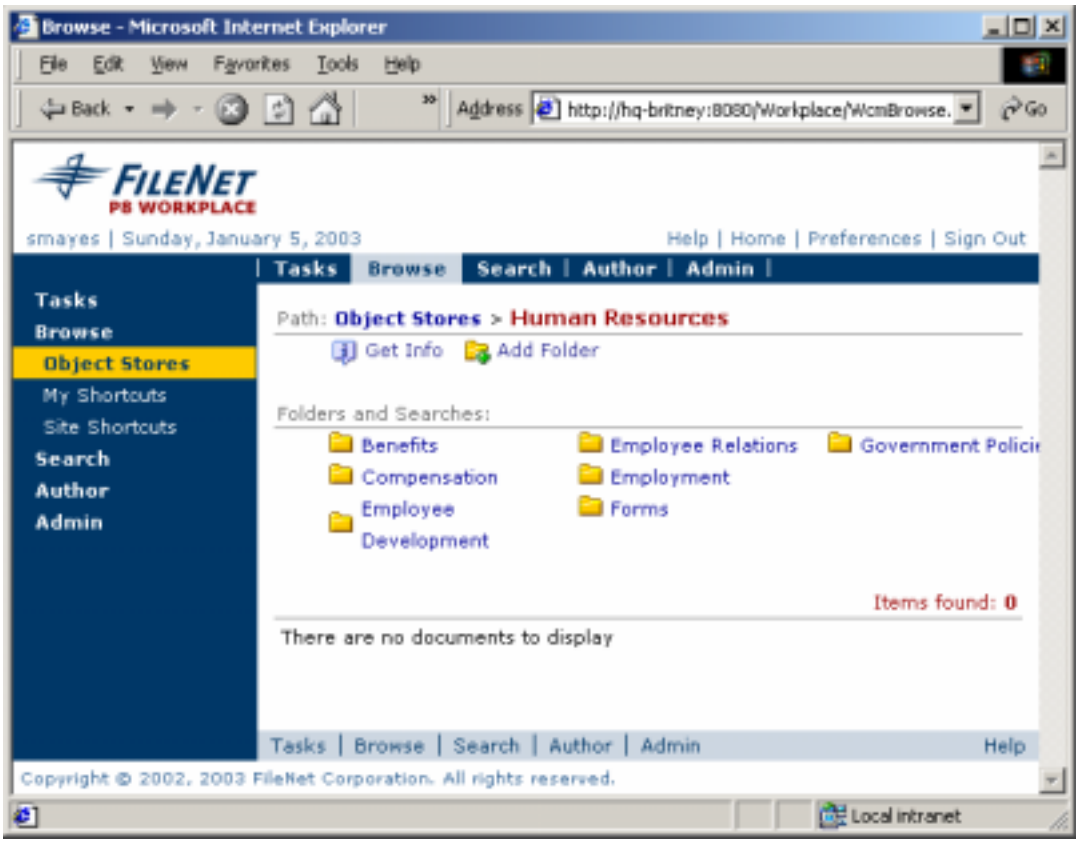
Document management - users can browse, search, version documents, create folders, create renditions and personalize with favorites. Advanced users and administrators can customize Workplace, including the definition of templates for entering objects, searching and publishing.

Business process management - users can view tasks, perform tasks, re-route tasks, launch workflows and track workflows. Application developers and business analysts can define and manage business processes and configure how those processes are launched. Analysts can analyze business processes and perform "what-if" simulations to improve those processes

Web content management - users can create and approve content for delivery to a web site.

Application development - developers can use Workplace as a development tool for building and testing processes and for customizing Workplace to add additional capabilities.

The following screenshots illustrate the Workplace user interface. The first screenshot shows browsing for documents and the second screenshot shows a user's task list.


Browse - Microsoft Internet Explorer
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Go
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Object Stores
My Shortcuts
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Author
Admin
Path: Object Stores > Human Resources
Get Info
Add Folder
Folders and Searches:
Benefits
Compensation
Employee Development
Employee Relations
Employment
Forms
Government Policie
Items found: 0
There are no documents to display
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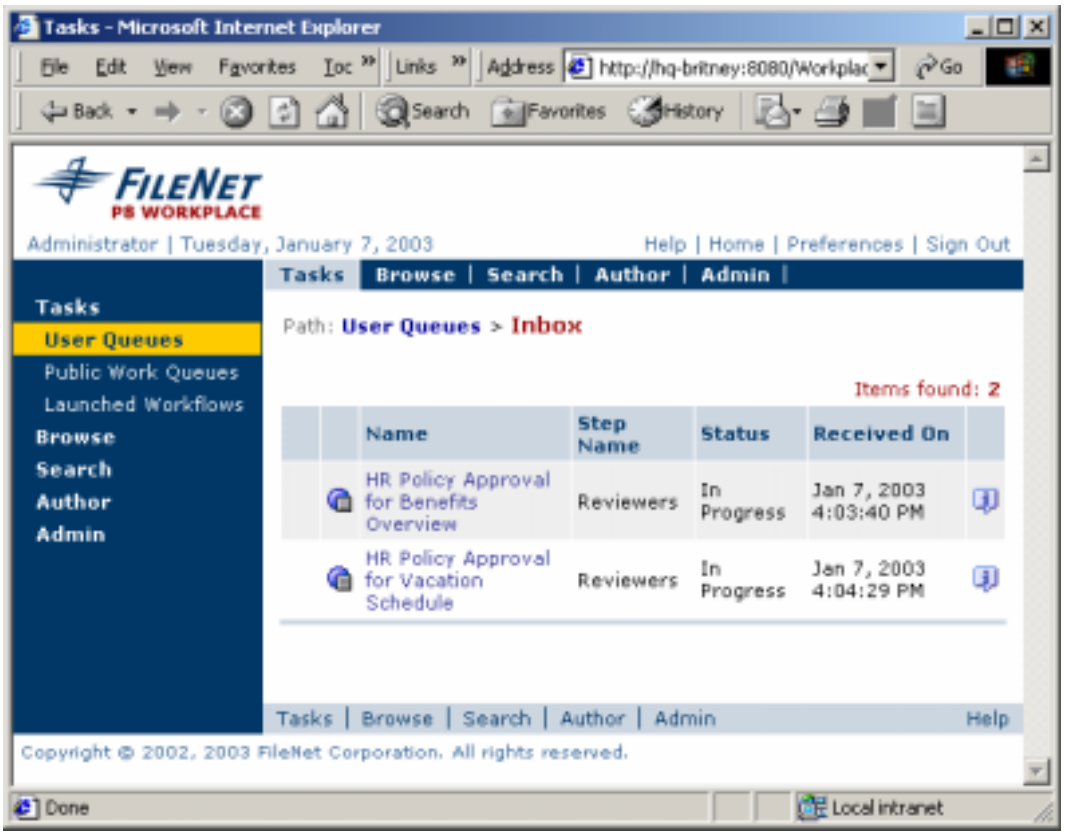
Help
Copyright © 2002, 2003 FileNet Corporation. All rights reserved.
Local intranet


Tasks - Microsoft Internet Explorer
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Tasks
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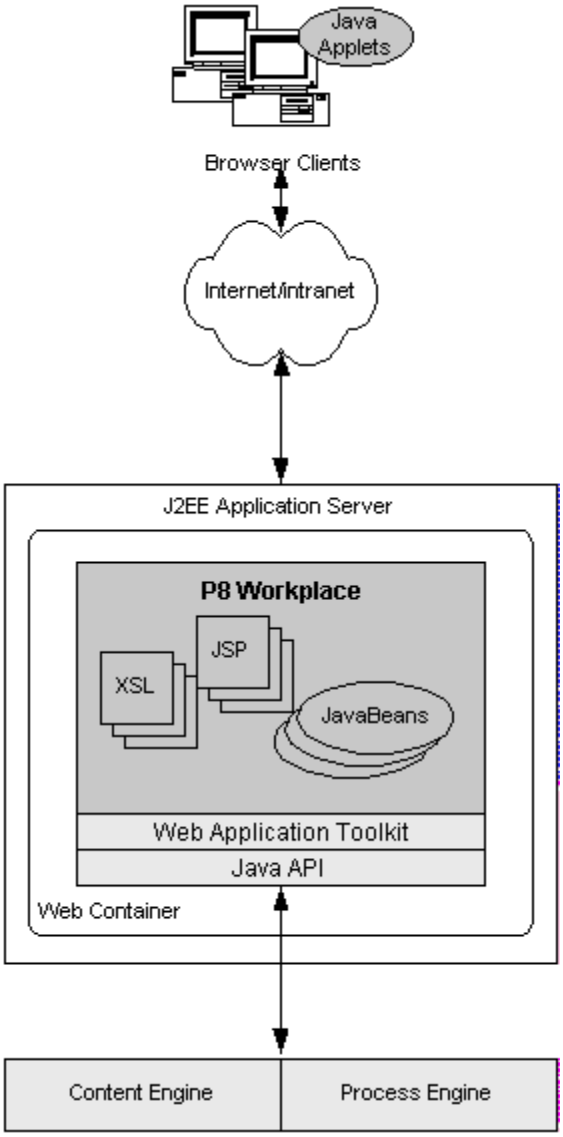
Public Work Queues
Launched Workflows
Browse
Search
Author
Admin
Path: User Queues > Inbox
Items found: 2
Name
Step Name
Status
Received On
HR Policy Approval for Benefits Overview
Reviewers
In Progress
Jan 7, 2003 4:03:40 PM
HR Policy Approval for Vacation Schedule
Reviewers
In Progress
Jan 7, 2003 4:04:29 PM
Tasks | Browse | Search | Author | Admin
Help
Copyright © 2002, 2003 FileNet Corporation. All rights reserved.
Done
Local intranet

From an architectural perspective, Workplace is built using the FileNet Web Application Toolkit and runs within a Web Container on a J2EE™ application server. Workplace leverages XSL for rendering many of its user interface elements – such as query results and folder contents. The majority of functionality provided in Workplace is zero-download HTML that runs under many browsers on any platform. Advanced capabilities that are graphic-intensive are provided as Java applets, including the Process Designer, Process Configuration Console, Process Administrator, Scenario Designer , Scenario Console, Search Designer, and Publish Designer. The source code for Workplace, with the exception of the Java applets, is distributed for customers and partners to leverage and extend.



Web Content Manager

The Web Content Manager (WCM) is an application that provides web content management capabilities that leverage the core content and process management capabilities provide in the platform. The following describes roles and typical tasks performed in the Web Content Management application:

Content Contributors

- Creates textual content for the web site. May contribute content using WCM editors, Workplace and Microsoft® Office.

Webmaster/Template Designer

- Defines the overall site design and look-and-feel and handles miscellaneous tasks.
- Uses the "Control Center" to create templates, categories, etc.

Designer

- Creates graphics for the site, typically working in Photoshop and using WebDAV or Workplace to place graphics on the site.

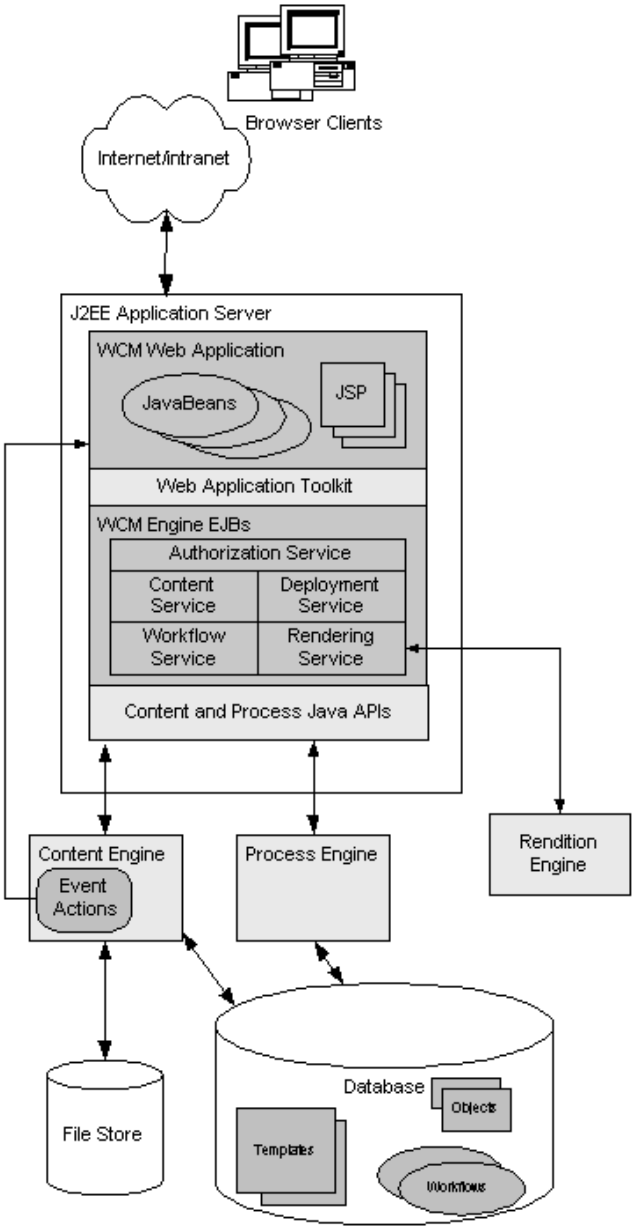
Site Administrator

- Performs general administration tasks, including access control and workflow management.

Developer

- Creates Java and JSP files that make a site interactive, for example a site poll.

As shown in the architecture diagram below, the Web Content Manager consists of a web application and a set of services collectively referred to as the Web Content Manager Engine.



The WCM web application is built with JavaServer Pages™ and JavaBeans™ and leverages FileNet's Web Application Toolkit. The WCM web application uses the WCM Engine, a collection of Enterprise JavaBeans™ that provide the following services.

Content Service - Manages page structure data and interacts with the Content Engine to store and manage site content and templates.

Authorization Service - Provides authorization services via the Content Engine and includes a caching model that is tailored to WCM usage patterns.

Rendering Service - Assembles pages and components and updates component relationships.

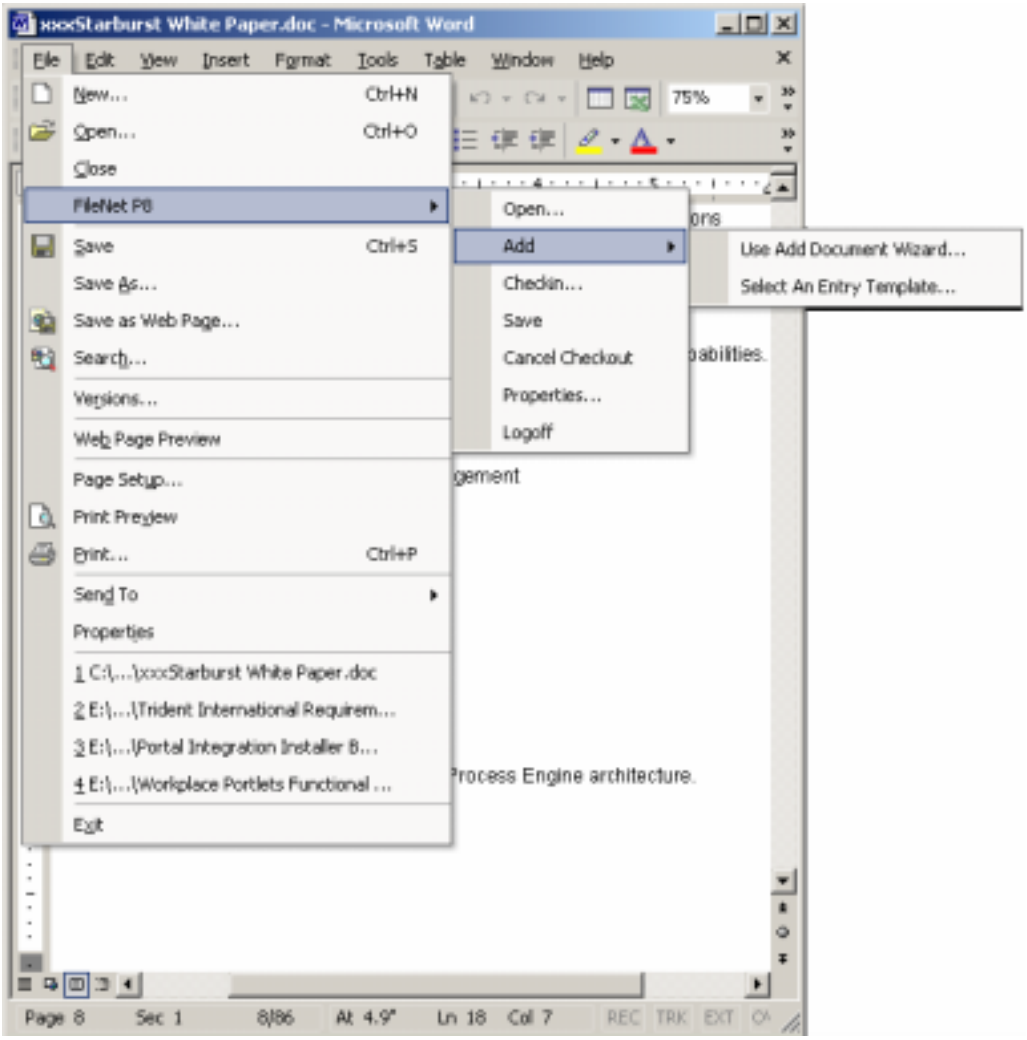
Deployment Service - Deploys content to a file system, database or application.

Workflow Service - Interacts with the Process Engine to provide WCM focused process functionality.

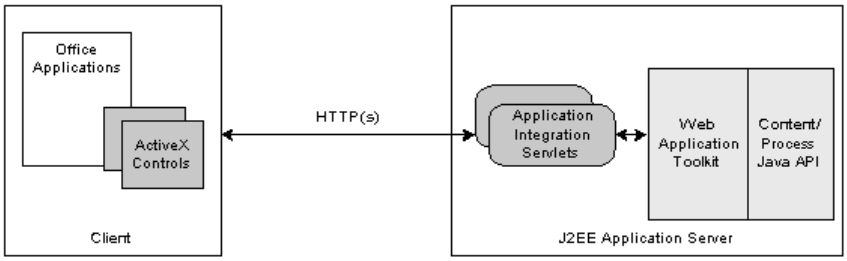
The Content Engine event model provides the mechanism to notify WCM when content has been placed in a web folder and when that content has been changed by applications other than WCM.

Integration for Microsoft® Office

FileNet's integration with Microsoft® Office and Outlook allows users to easily manage Office documents and e-mail messages. In addition to versioning Office documents, users can browse object stores, insert properties into Word and Excel documents, use entry templates to version documents and launch approval workflows, and publish Office documents to a web site managed by WCM.



To provide seamless integration with Microsoft® Office, ActiveX controls are installed on the client workstation. These controls communicate over HTTP using the Application Integration API, which consists of a set of Java Servlets™ that run on the J2EE™ application server where Workplace is installed. These servlets return XML to the ActiveX controls, which then parse the XML for display in the user interface.

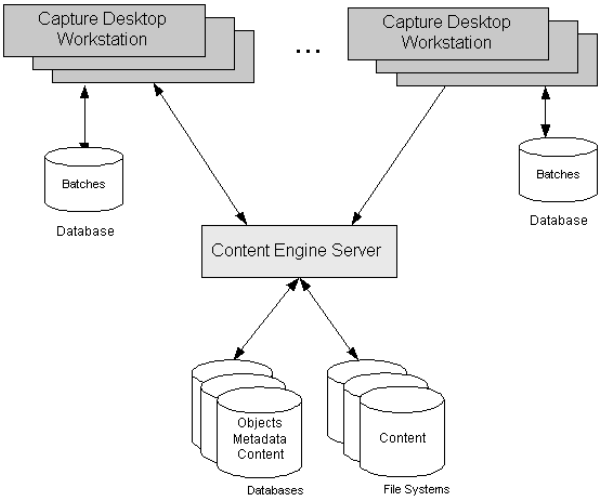


Capture

Image capture capabilities are provided via the FileNet Capture product, which includes the following:

- Low to medium volume image scanning, where scanned images are stored in the Content Engine
- Electronic file import
- Document processing, such as de-skew and de-speckle
- Blank page detection
- Assembling images into documents
- Automated indexing
- Index and image verification
- Image to PDF conversions and full text OCR
- Zonal OCR (Optical Character Recognition)
- Incoming FAX entry
- Distributed processing stages that allow different users to perform scanning, indexing, and index verification

As shown in the diagram below, Capture uses a Microsoft® SQL Server database as an intermediate store for scanned images and indices (batches) which are then committed to a Content Engine object store. The separate database for batches allows the majority of capture processing to be performed with little impact to Content Engine performance. The diagram also shows how Capture workstations can be distributed to handle higher image throughput requirements.

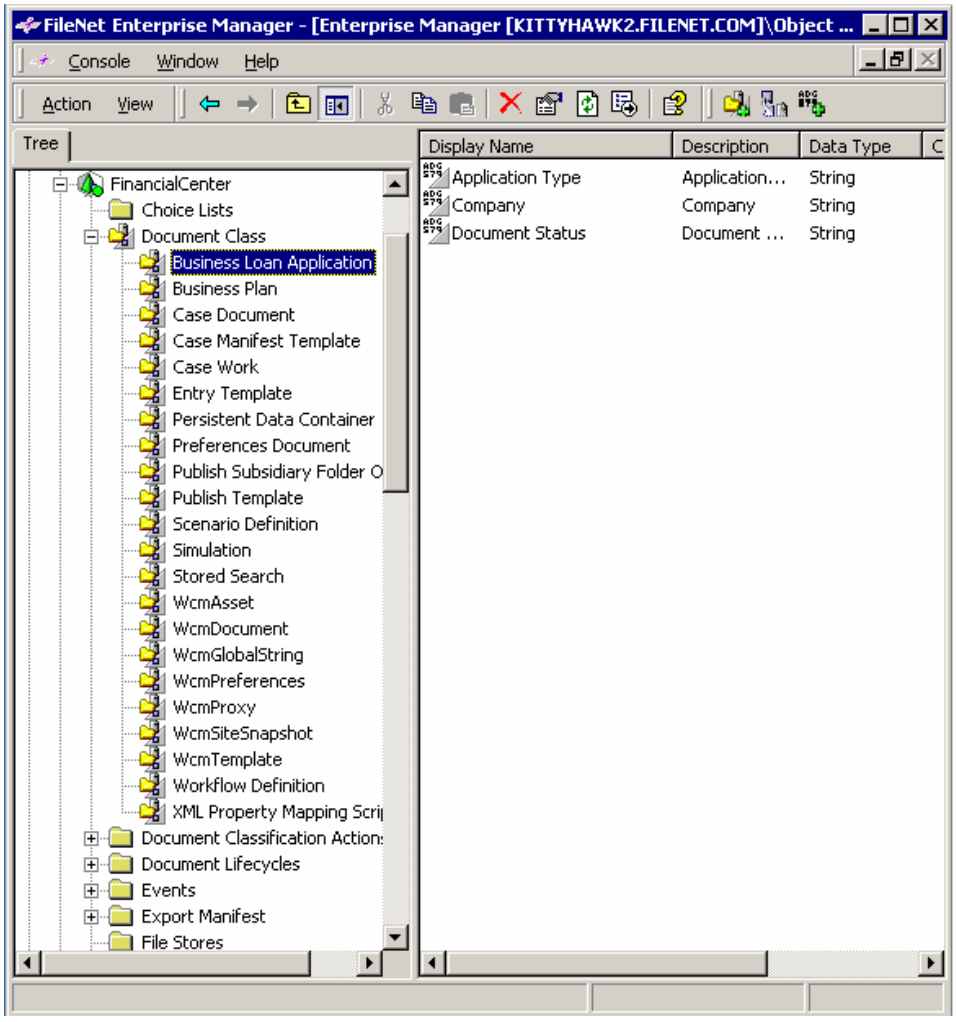


Enterprise Manager

The FileNet Enterprise Manager is a tool that administrators use to manage Content Engine services and object stores. The Enterprise Manager provides a graphical, wizard-based user interface to perform the following tasks:

- Create and manage object stores and file stores
- Manage services
- Create and manage classes and properties
- Create and manage security policies and default security for object authorization
- Create and manage lifecycle policies
- Create and manage event subscriptions
- Import and export objects and metadata definitions as XML
- Search and perform bulk updates on search results
- Configure XML classification
- Perform document management tasks (checkin, checkout, etc)
- Configure trace logging

The following screenshots shows the user interface for the Enterprise Manager.



Process Task Manager

The Process Task Manager is a tool that administrators use to manage and configure the Process Engine services, including the Process Service, Pooled Process Manager, Process Router, and Process Analyzer.

Application Development

The FileNet P8 family of products provides an extensive collection of development tools that span the content and process management capabilities outlined in this document. These tools include:

- Graphical tools for defining the various components that make up an application, including processes, metadata definitions, searches, and templates
- Java APIs for programmatic access to content and process capabilities
- Integrations with leading portal vendors for building web-based applications
- Solution templates that jumpstart the application development process
- User interface elements that can be reused in custom applications

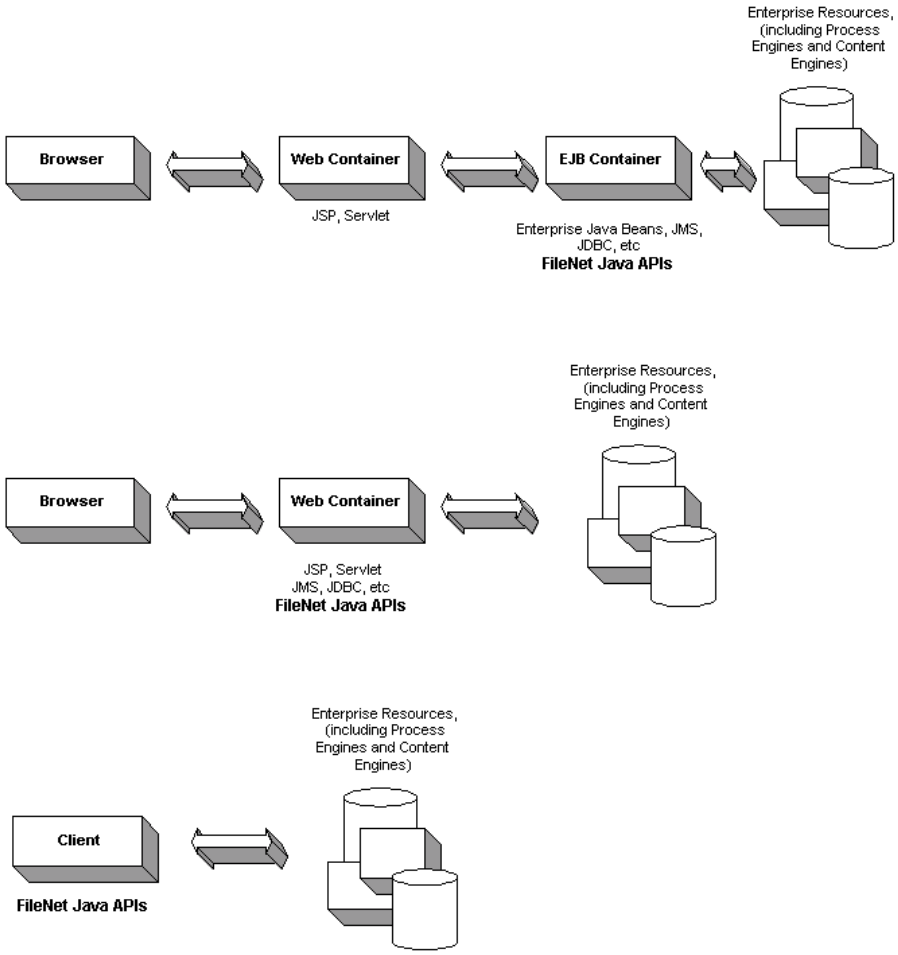
Java™ 2 Platform Enterprise Edition (J2EE™) support

FileNet provides J2EE™ Application Components and System Components[1] that operate in J2EE™ Platform Products (application servers) such as BEA WebLogic® and IBM WebSphere®. In addition, FileNet applications leverage the J2EE™ application model to build multi-tier applications that deliver the scalability, accessibility, and manageability required by enterprise applications. Details about how FileNet is used in a J2EE™ environment are covered in the remainder of this section.

Content/Process Java API

An extensive set of Java Classes are provided for programming custom applications and for extending the out-of-the-box applications. These classes provide programmatic interfaces for interaction with the Content and Process Engines. These APIs can be used to build a variety of application architectures, including those that rely on a J2EE™ Web Container (JavaServer Pages™ and Java Servlets™), Enterprise Java Beans (EJB) Container, or J2SE stand-alone Java applications – as shown in the following diagrams.

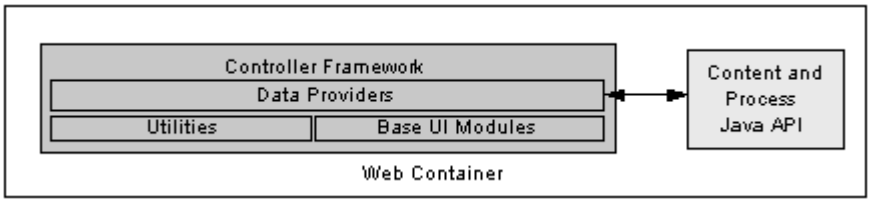
[1] Refer to Java™ Platform Enterprise Edition Specification, v1.4 for a description of these component types.



Web Application Toolkit

The Web Application Toolkit provides a framework for developing web applications that run in a J2EE™ environment. The toolkit is used by several FileNet P8 applications, including Workplace, Solution Templates, and the Web Content Manager.

The diagram below provides a logical view of the Web Application Toolkit architecture.



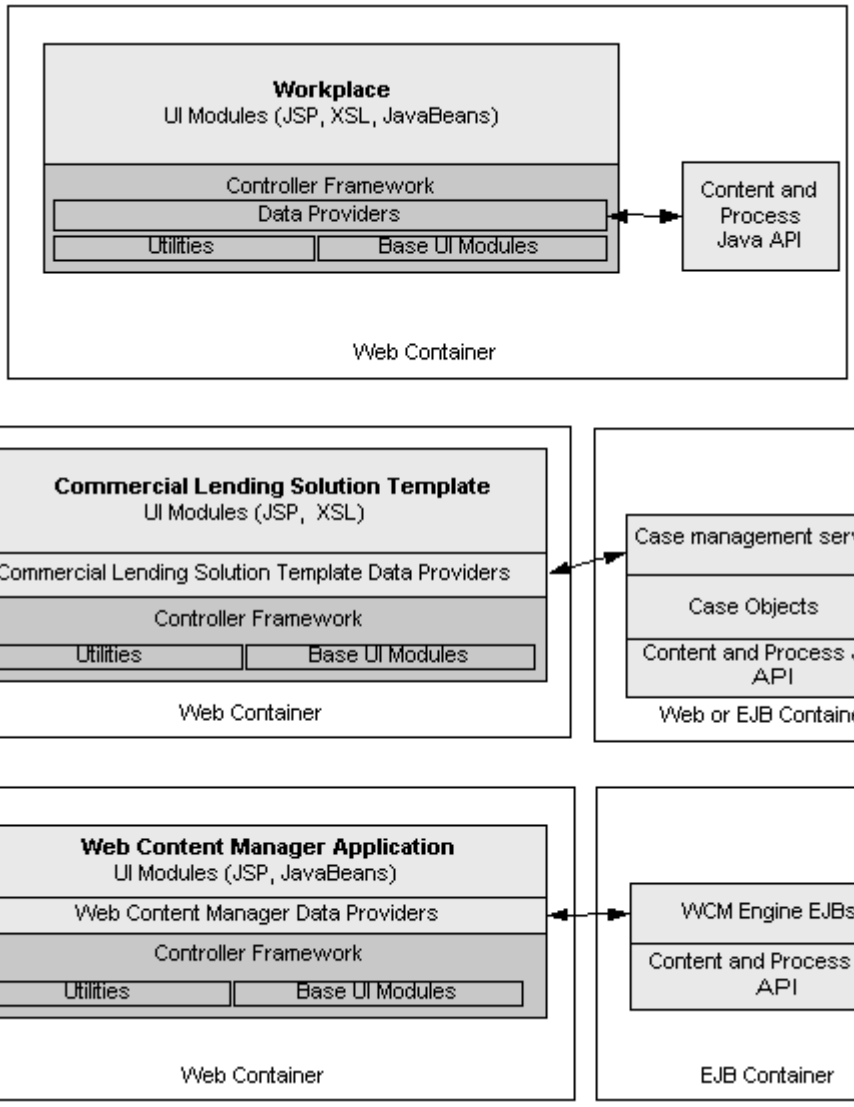
Controller Framework provides base classes that support the Model-View-Controller (MVC) architecture that the Web Application Toolkit is built upon. MVC is a common design pattern that decouples data access, business logic and presentation – resulting in applications that are easier to develop and update over time.

Utilities handle various functions, such as localization support for building global applications and a model for storing user preferences and web site configuration options.

Base UI Modules provide base behavior and data structures for reuse in user interface components such as wizards, menus and toolbars.

Data Providers provides data for the application by encapsulating server APIs such as FileNet's Java APIs or other 3rd party services.

The different components of the toolkit can be leveraged at different levels depending on the application characteristics and requirements. The next figures illustrate this by showing how the toolkit is used by Workplace, the Commercial Lending Solution Template, and the Web Content Manager application.



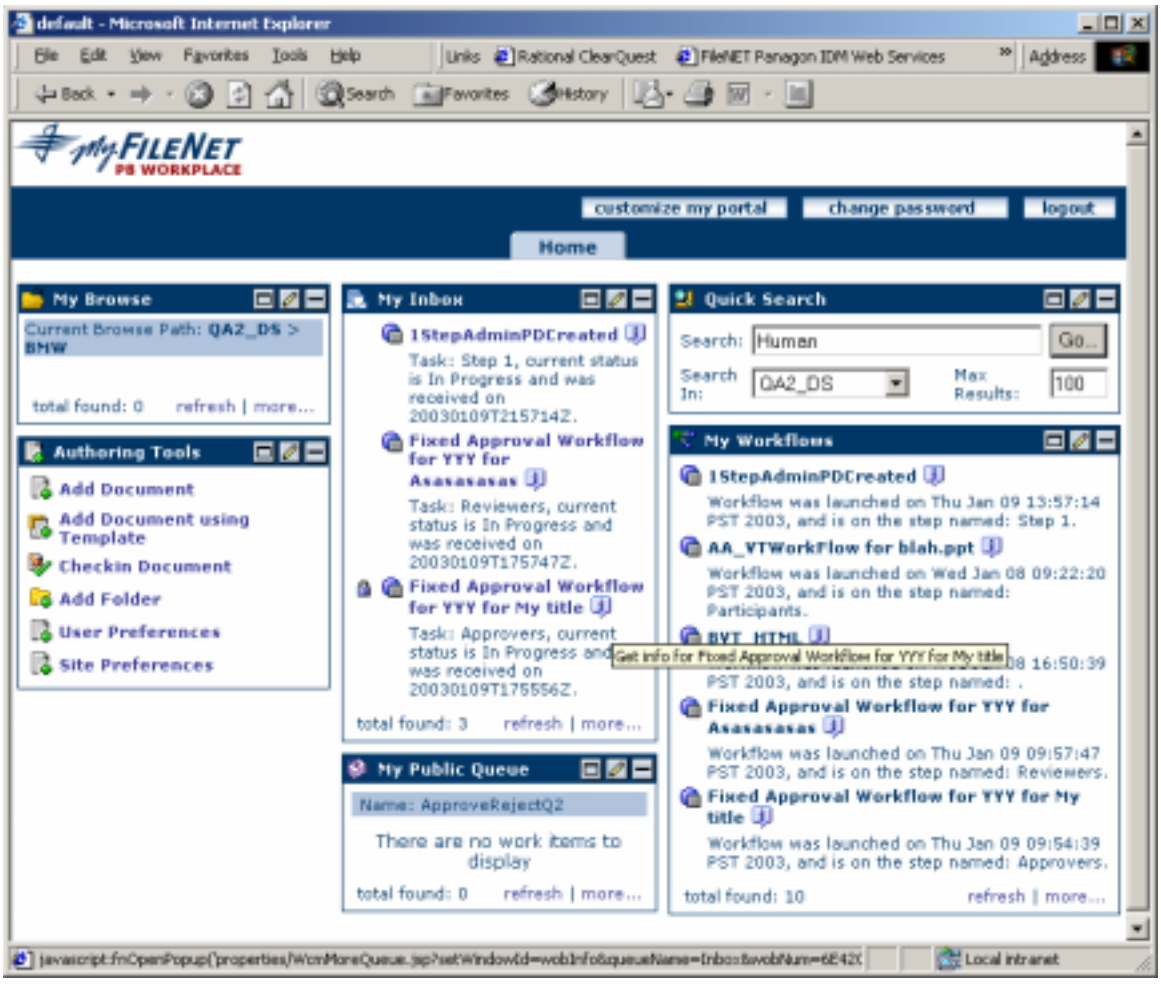
As shown in the diagram, Workplace leverages all components of the Web Application Toolkit, including the data providers. Additional functionality provided by Workplace includes user interface components – including JSP pages that specify the page layout, JavaBeans™ that render user interfaces, XSL documents that are used to control how XML returned from the Java API is rendered in the user interface, and Cascading Style Sheets (CSS) that define fonts, colors, etc.

The Commercial Lending Solution Templates and Web Content Manager Application leverage the Controller Framework, Utilities, and Base UI Modules. Both applications provide their own Data Providers to interact with, respectively, the WCM Engine and Case management services.

Portal Integrations

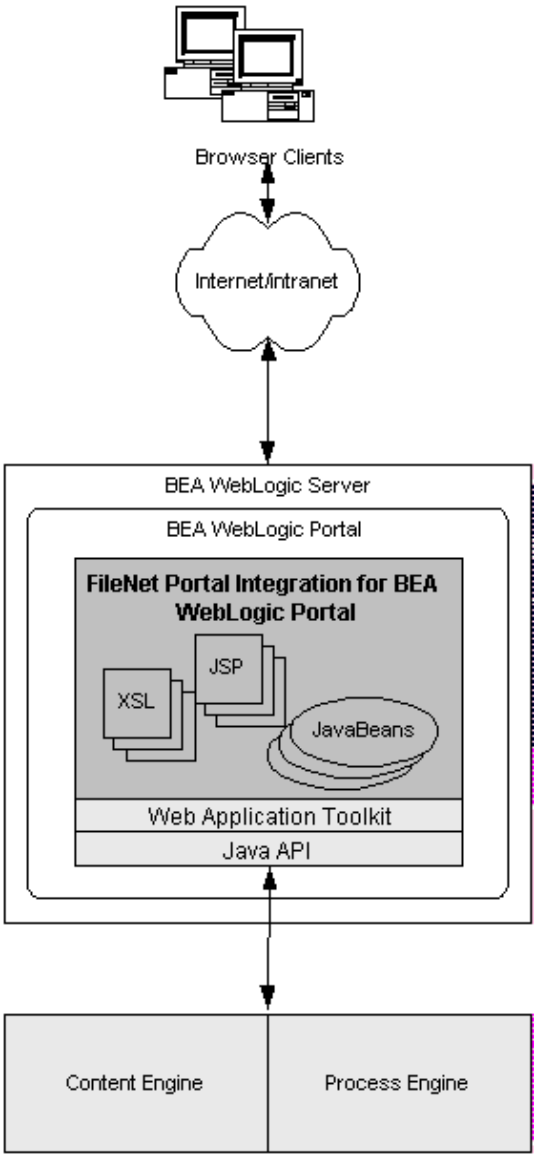
Portal integrations provide commonly required content and process functionality within 3rd party portal products. Portlets which are user interface elements provide the following end user functionality:

- Browse
- Search
- My workflow tasks
- Public workflow tasks
- My workflows
- Authoring



Initially, FileNet is providing a portal integration for BEA WebLogic Portal™. Other portal product integrations will be provided in the future. However, customers and partners can create their own portlets using FileNet's Java APIs. In addition, FileNet distributes the source code for the Portlets so that customers and partners can modify and extend the capabilities if desired.

Architecturally, the Portlets leverage the Web Application Toolkit, as shown in the diagram below that illustrates the FileNet portal integration with BEA WebLogic Portal™.



Solution Templates

Solution Templates are blueprints for developing vertically focused solutions. Built on the FileNet P8 architecture, a Solution Template provides working code that can be configured and extended to build complete applications. A Solution Template is not a turn-key application; rather, it can be thought of as an application development template. By providing much of the application's core infrastructure, it can significantly reduce the development/deployment cycle.

Solution Templates:

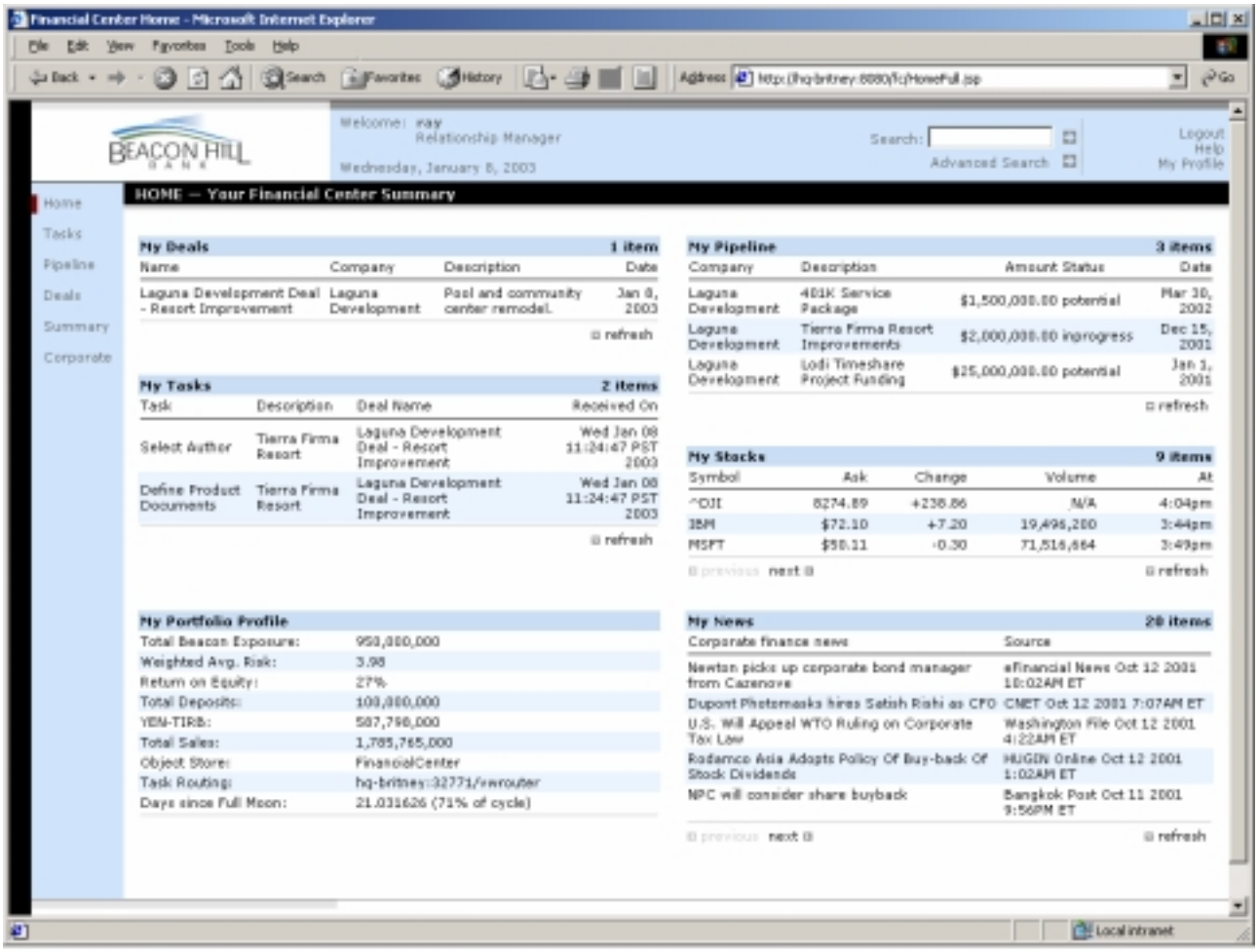
- Illustrate how FileNet technologies can be used to solve specific business requirements.
- Serve as templates for partners to jumpstart the building of customer solutions or industry applications. FileNet provides an application infrastructure and partners provide industry-specific domain knowledge and build out the solution to meet customer requirements.

- Add value to the underlying platform by providing a blueprint for building vertical business solutions.
- Promote best practices for applications that are similar to the application targeted by the Solution Template.
- Are architecturally more complete than typical sample applications. For example, complete error handling is provided.

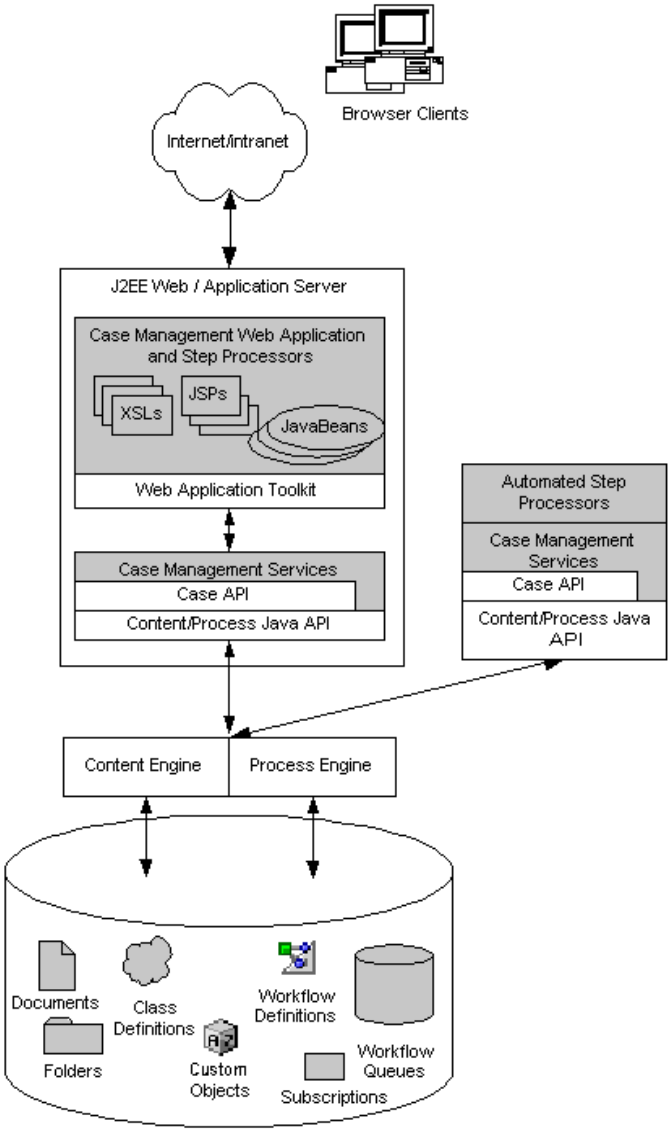
Initially, FileNet is providing a Case Management Solution Template and Commercial Lending Solution Template. The Case Management Solution Template leverages the Case Management API to provide generic case processing functionality. The Commercial Lending Solution Template uses the generic Case Management Solution Template to implement a commercial lending template. The following table lists the features provided in the Case Management Solution Template and Case API and shows how that functionality is manifested in the Commercial Lending Solution Template. Both Solution Templates can be customized to meet specific application requirements.

Case Management Solution Template and Case Management API	**Commercial Lending Solution Template**
Case - A case is defined by a business process and its associated content. A case typically involves a number of users who play specific roles to process the case.	Case - A loan or other service that a financial institution offers to its customers where the case processing involves the origination and approval of the loan or services. For example, a case might be a commercial loan or a line of credit. The case processing involves gathering information about the customer to determine if the loan and line-of-credit are good investments for the financial institution to make.
Provides a Case File class and Case Document class that define a base case type and base case document type. These classes can be sub-classed to define specific case and document types.	Provides a subclass of the Case File that includes metadata about the customer. Pre-defines classes for document types associated with the processing of the case including Business Loan Application and Business Plan.
Defines roles for processing the case. The roles can be customized and the user interface is tailored for each role.	Defines several roles including the customer, a relationship manager who manages the deal, and a sales manager who manages a team of relationship managers.
Provides a model, called a case manifest, for defining the types of documents that must be filed in the case. Also defines the workflows which are run to create and approve the documents.	Defines specific document types such as Loan Application and Business Plan.
Defines workflows for case creation and approval, document creation and approval, and exception handling. Ties these workflows together to define the overall case processing logic.	Customizes the workflow to meet loan approval requirements.
Provides a web application for processing work items and interacting with the case.	Includes minor customization to the user interface, including integration with a CRM system, new logos, and style sheets that demonstrate a different look-and-feel.

The following screenshot illustrates the user interface for the Commercial Lending Solution Template.



The architecture for the Case Management Solution Template is shown in the diagram below. The template includes a set of pre-defined objects in the database at the bottom of the diagram. Case management services provide access to the Case API. A JSP-based web application that includes step processors provides the user interface. Automatic step processors perform steps that do not require human interaction.



Case Management API

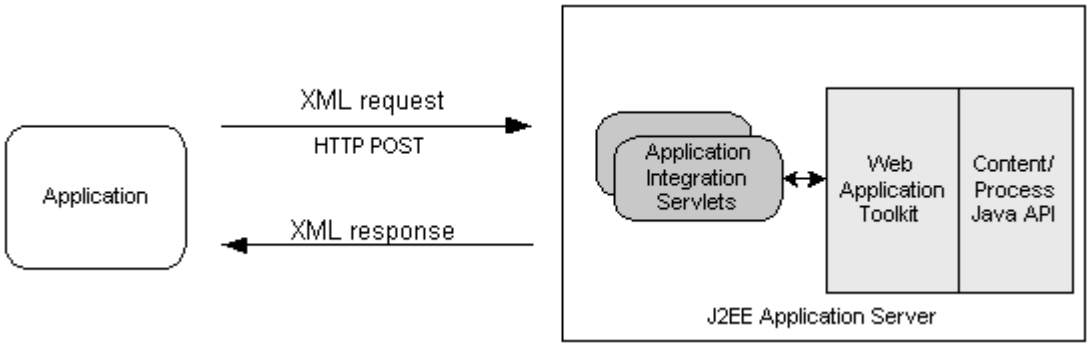
The Case Management Object Model (Case API) provides a framework for building case management applications that combine content and process to build “case files” that are associated with workflows which process the objects in the case file – including the creation and approval of documents that are filed in the case. In addition, the Case API provides a case templating capability that allows developers or administrators to define the document types that are required in the case.

The Case API consists of a set of Java classes, where usage of these classes is demonstrated in the Case Management and Commercial Lending Solution Templates described in the previous section.

Workplace Application Integration Toolkit

The Workplace Application Integration Toolkit is an HTTP-based programmatic interface that provides content management functionality. This toolkit is used by FileNet to provide integration with Microsoft® Office and has been documented so that customers and partners can use the toolkit to integrate with other applications.

The diagram below illustrates how a client application generates XML that contains a request for information and uses HTTP POST to send the XML to a web server where the Application Integration Java Servlets™ are running. The servlets parse the XML and make the appropriate calls to the FileNet APIs and then package the results into XML that is then sent back to the client as the response to the HTTP POST. For example, the client generates an XML message for getting the contents of a folder and wraps that message in an HTTP POST request. The servlet receives the request and calls the APIs to retrieve the folder contents, which is then passed back to the client as XML within the response.



Component Integrator

The Component Integrator described in the Services section above provides an easy way for developers to write components, such as Java classes, that can be leveraged by users who create workflow definitions using the graphical Process Designer tool.

Image Services Resource Adapter

The Image Services Resource Adaptor is a set of Java classes for interacting with FileNet Image Services. These classes conform to the J2EE™ Connector Architecture. Customers can use this programmatic interface to query for, retrieve and create documents in an Image Services repository. Workplace integrates with the Image Services Resource Adaptor and demonstrates how you can create documents within an object store that point to images stored in Image Services.

Capture Toolkit

The Capture Toolkit allows customers and partners to build additional functionality for the image capture process. This additional capability can be plugged into Capture, or can be a separate, stand-alone application.

Content Engine Events

The Content Engine's event model provides a key application development capability that allows developers to specify custom actions that occur when objects are added or updated in the repository. This model makes it possible to build applications that are loosely coupled.

For example, two custom applications allow users to add documents to a repository. After the applications have been completed and deployed, a new requirement specifies that certain document types be recorded in an existing tracking database for legal review. Instead of requiring that both applications be updated to record the document in the tracking database, an event subscription is applied to the Content Engine server which automatically records the documents. In other words, the applications do not always require updating when new functionality is added to the system.

Events are described in more detail in the Events and Subscriptions section of this document.

Workplace Customization

Workplace can be customized by modifying preferences and by modifying the Workplace source code. Site preferences are configuration options that can be set in the Workplace user interface by administrators. Example customizations that can be done via site preferences are listed below. Note that there are many other site preferences that are documented in more detail in the product documentation.

- Configure listings to show either a detailed view or a magazine view. Detailed view shows a list of properties specified by the administrator in a tabular format. Magazine view shows a phrase which is constructed by concatenating properties along with additional text as defined by the administrator.
- Change what the users see when they enter Workplace, for example, start in Search, Browse, Tasks, or Author.
- Create "site shortcuts" which navigate the user directly to a specified folder, search, or entry template.
- Change what the user initially sees when browsing and searching: either all object stores or specific folders or searches that have been designated as site shortcuts or user-defined shortcuts.
- Configure which properties are shown for each object store.
- Register external application links to allow the user to navigate to sites or tools outside of Workplace.
- Register Java Servlets™ that support retrieving external documents whose content resides in another repository.

In addition to site preferences that are defined by administrators and apply to all users, Workplace supports user preferences which apply to individual users. User preferences support the following.

- Override some site preferences – such as what the user initially sees when starting Workplace and whether or not they are shown in detailed or magazine view.
- Create shortcuts to folders, searches, and entry templates.
- Define default search criteria for "My Search."

The types of customization done via source code modification are limitless. Examples of custom modifications include the following.

- Integrate viewers that support viewing a wide variety of document formats and allow users to mark-up the documents.
- Add additional capability to the existing Workplace capabilities, such as additional operations for multiple selection and sorting.
- Display data from other systems, such as adding a column that shows data related to the document but which is stored in a separate application.
- Modify the look-and-feel by changing graphics, logos and style sheets.
- Remove functionality that is not required for the application; for example, remove the Author page or restrict the user to browse a single object store.

Features

This section of the white paper provides an overview of the features provided by the P8 family of products.

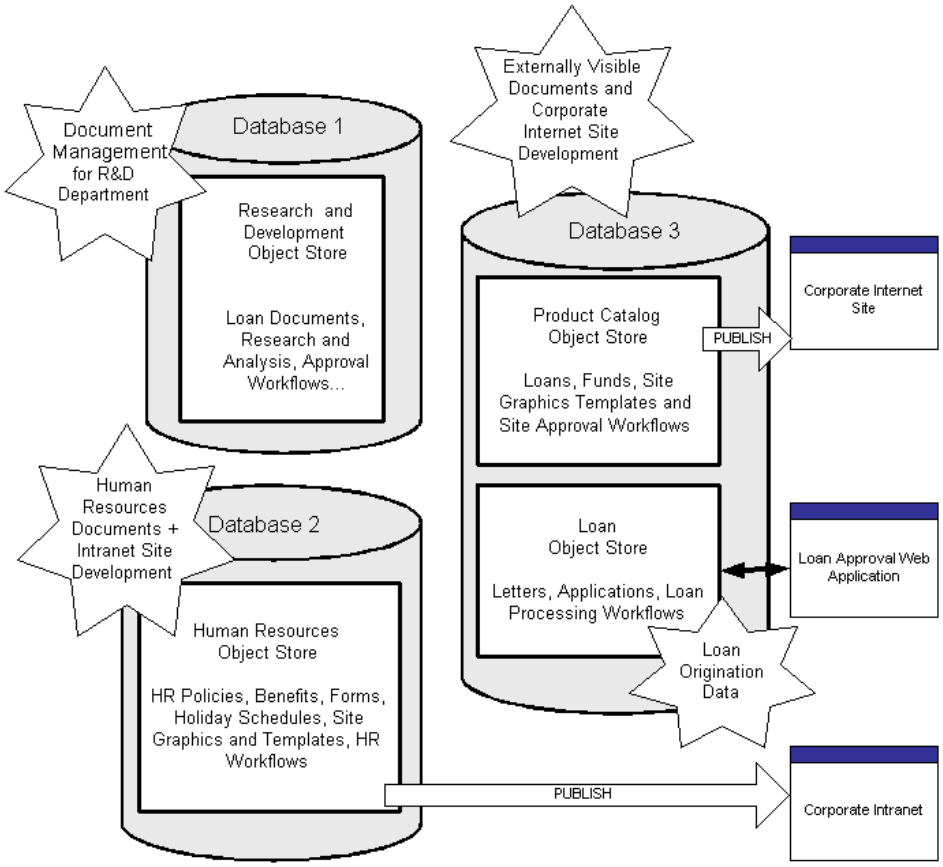
Content Management

At the core of the platform are repository services for capturing, managing, and storing your business-related digital assets. Multiple repositories, called object stores, can be created and managed within a single system to serve your business requirements. Object stores can be configured to store content in a database, file system, or combination of both.

An object store is capable of storing a variety of business related data, for example, an insurance claim, a customer loan account, or information about business partners. It can also store any type of structured or unstructured content such as XML documents, Microsoft® Office documents, web pages, photos, voice, images, process definitions, templates, and more.

The following diagram illustrates object stores that a financial institution might require. The Research and Development object store is for internal usage and contains documents related to the development of new products and services. The Human Resources object store contains information for employees and is also used to manage the corporate intranet with the FileNet Web Content Manager.

The database on the right contains information that is published to the company's internet site, such as information on products and services, plus the graphics and templates used to publish the information to the corporate internet site via the Web Content Manager. The Loan Object Store contains data that is used for the loan approval process.



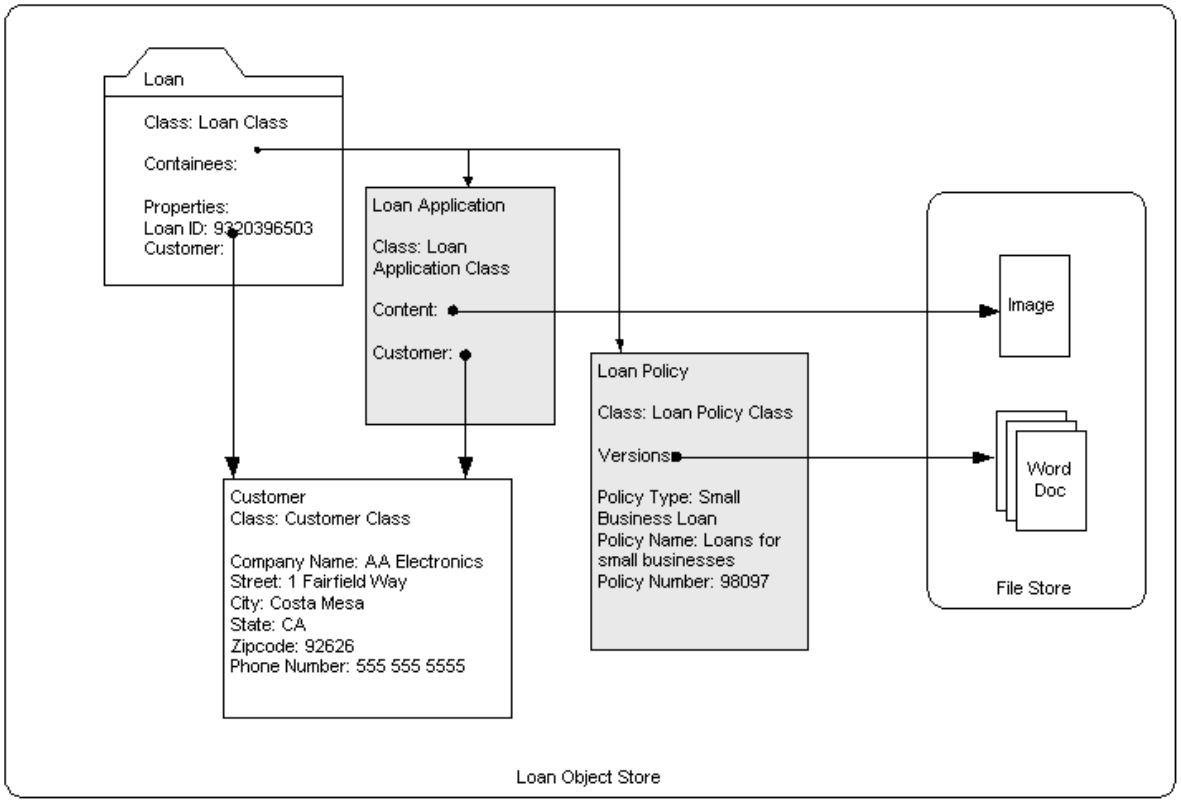
Business Object Management

Traditionally, a document management system manages document content and the metadata (properties) that further describes the document. The Content Engine provides document management capabilities plus the ability to manage other types of data. For example, as shown in the figure above, object stores manage traditional office documents plus customer information and loans. In this context, the term "business object" refers to any object that is stored and managed in the system – and includes both structured and unstructured data.

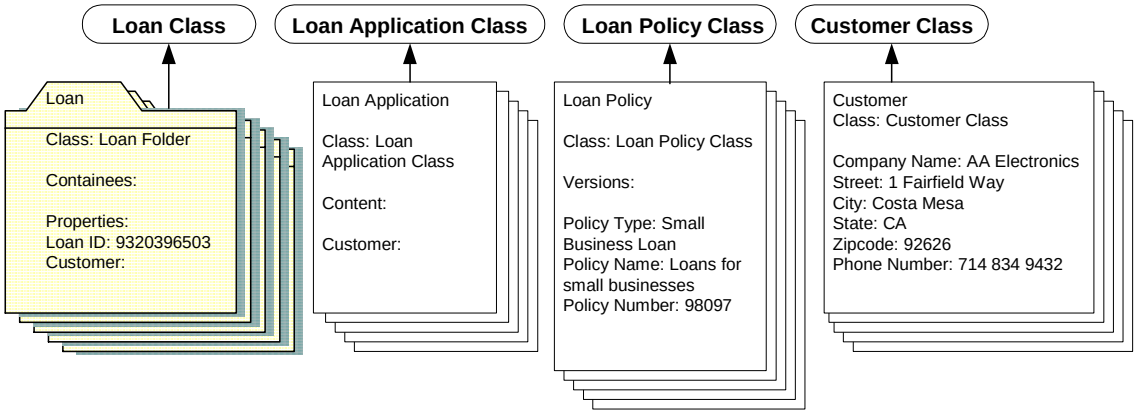
For example, the following diagram shows four objects: Loan, Loan Application, Customer, and Loan Policy. As illustrated in the diagram, an object may or may not have content. The Loan Application has a .TIF image as its content and the Loan Policy has a Microsoft® Word document as its content.

The Customer is an example of an object that has no content, but is simply a collection of properties that describes a customer. The Loan is an example of an object that has properties, but which also has "containees" or "folder contents" that are used to collect all of the information associated with a loan.

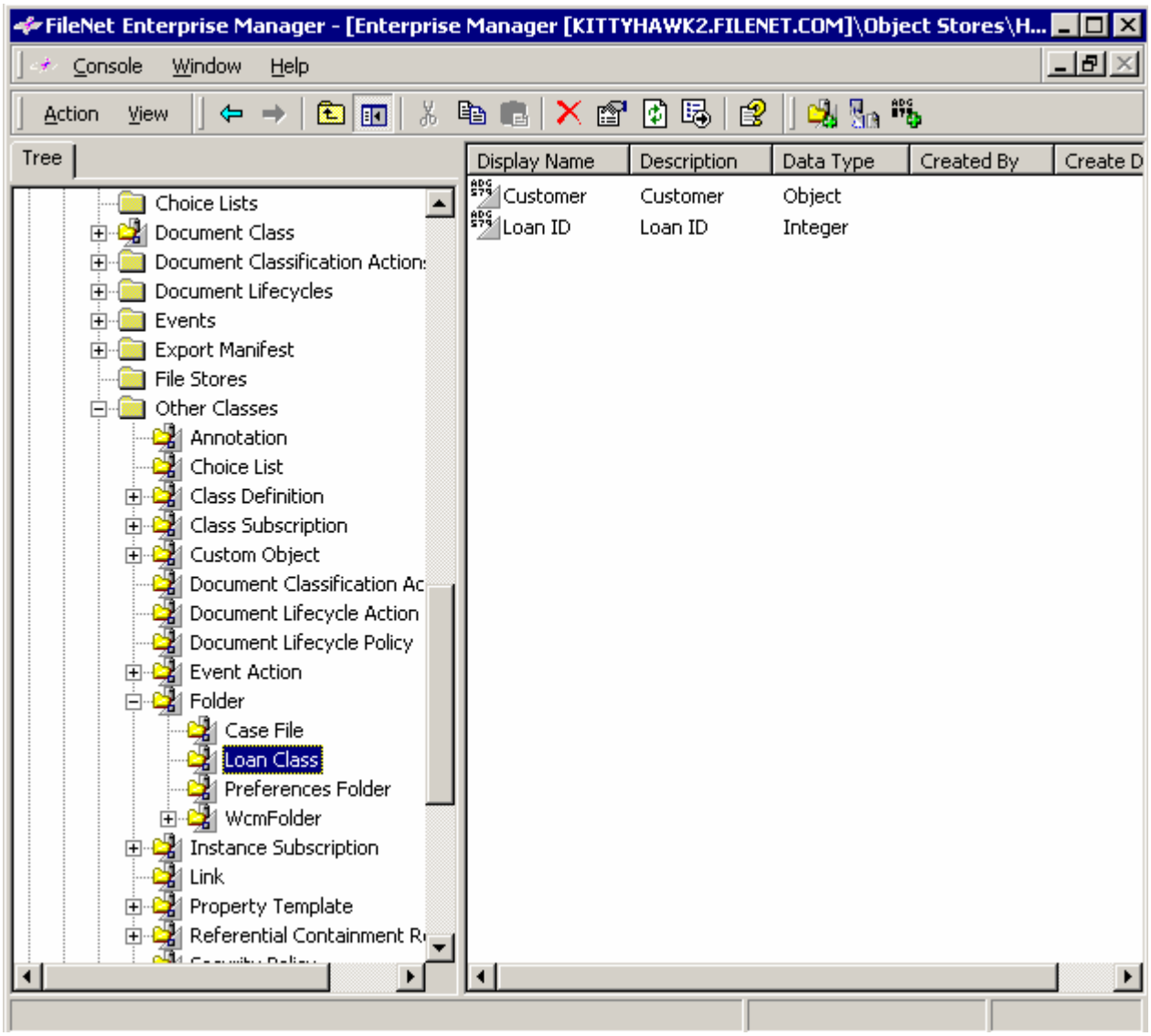
Leveraging the Content Engine's ability to manage data enables rapid development, where the objects are stored in a non-proprietary relational database format.



Every object in an object store is associated with a ***class***. Classes serve as templates for creating objects and define other characteristics such as the behavior and security of the object. Many objects share the same class, as shown in the figure below.



The system comes with a set of pre-defined classes, including Document, Folder, and Custom Object. These pre-defined classes define the behavior for most business-related objects. Customers can sub-class these classes to define variations of these basic types using the Enterprise Manager administrative tool. For example, the Loan class above is a sub-class of the “Folder” class because it requires “containment” behavior in the sense that it is a folder that contains the various documents associated with a loan. The Loan Class is customized to include a Loan Id and Customer property. The following screenshot shows a custom class in the Enterprise Manager.



The Content Engine enforces the behavior of the base Document, Folder, and Custom Object classes as described below.

Document – Most users think of a document as a file they create with an application such as Microsoft® Word. They store the document in the document management system so that a history of changes to the document is maintained and the document can easily be found and edited. Users who design enterprise content management applications and those who administrator them will need to understand how documents can be leveraged to support a variety of application needs. A document might be used to maintain a traditional electronic file as well as other types of data, such as an XML document or content that is managed in an external repository. Documents:

- Have system properties that the system manages automatically, such as Date Created
- Can have custom properties for storing business-related metadata about the document
- Are secured with access control lists
- Can have content that may be indexed for searching
- Can point to content that is outside of the object store (external content)
- Can have no content (metadata only)

- Can be versioned to maintain a history of the content over time
- Can be filed in folders
- Can have a lifecycle
- Can participant in business processes as workflow attachments
- Can generate server events when they are created, modified, or deleted which are used to customize behavior
- Can be renditioned to different formats, such as PDF and HTML
- Can be published to a web site

Folder – A folder is a container that is used to group other objects. Users typically think of folders as a place where documents are stored. Applications can leverage folders in a variety of ways, such as the traditional electronic folder or as a place where related information for a case – such as a loan or claim – is organized. Folders:

- Have system properties that the system manages automatically, such as Date Created
- Can have custom properties for storing business-related metadata about the document
- Are secured with access control lists
- Are hierarchical, in the sense that a folder may have sub-folders
- Can contain documents and custom objects
- Can participate in business processes as workflow attachments
- Can generate server events when they are created, modified, or deleted which are used to customize behavior

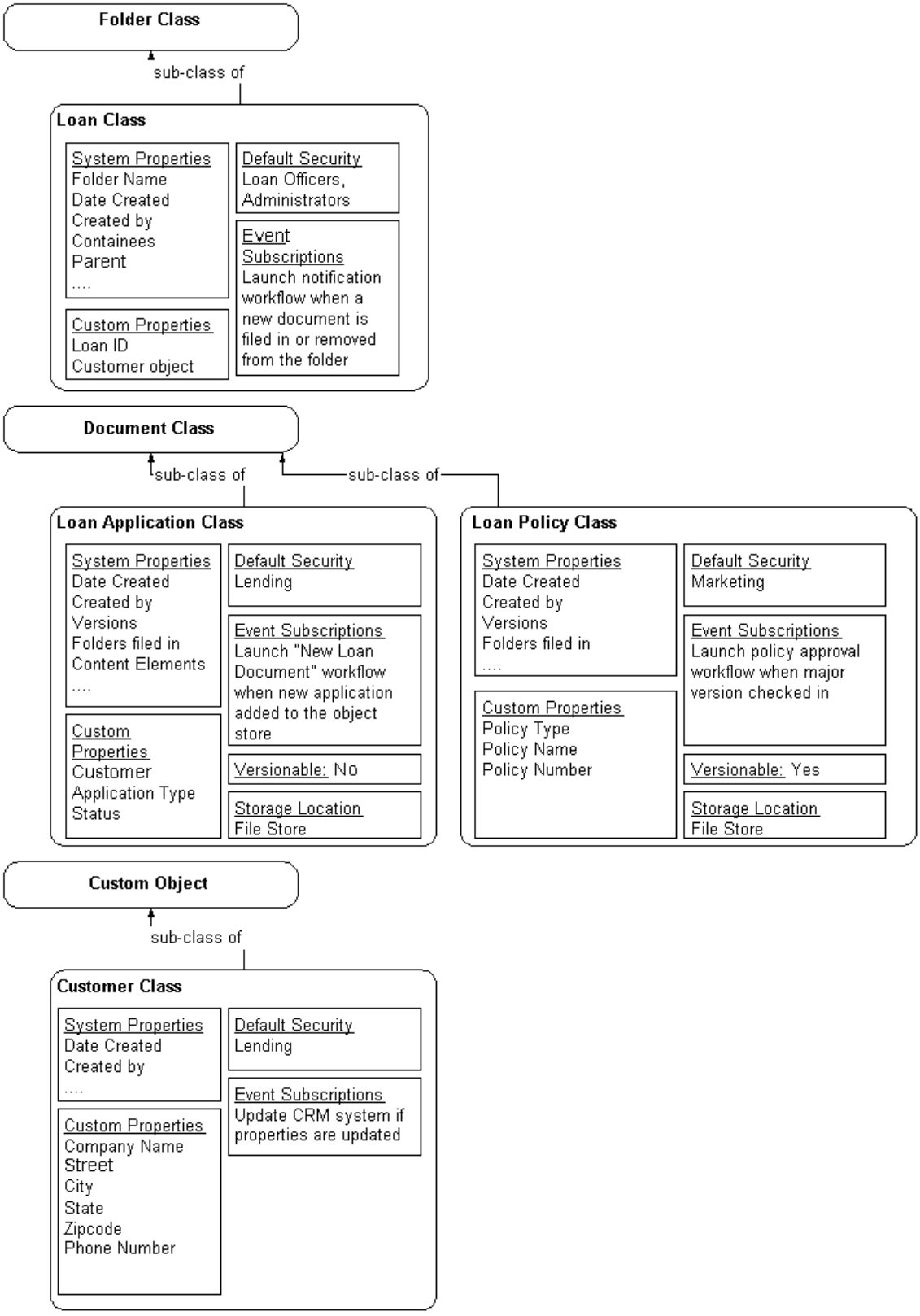
Custom Object - A custom object is typically used to store and manage data that does not have content. A custom object is essentially a document which doesn't have content (and thus doesn't support versioning) or a lifecycle. For example, a customer might be represented in the object store as a custom object because there is no requirement for content. Custom objects:

- Have system properties that the system manages automatically, such as Date Created
- Can have custom properties for storing business-related metadata about the document
- Are secured with access control lists
- Can participate in business processes as workflow attachments
- Can generate server events when they are created, modified or deleted and that are used to customize behavior

When sub-classing the base classes, you can define:

- Custom properties that are used to provide business-related metadata, for example Loan ID and Customer
- The default access rights for the object and security policies that may be applied to the object
- Event subscriptions for performing custom actions that are executed when the object is added or updated
- Where a document's content is stored, whether or not it can be versioned, its lifecycle policy, and any automatic classification templates

The following diagram shows the classes for the example Loan related objects shown in previous diagrams. See later sections of this document for more information about events, property types, etc.


Folder Class
sub-class of
Loan Class
System Properties
Folder Name
Date Created
Created by
Containees
Parent
....
Default Security
Loan Officers, Administrators
Event Subscriptions
Launch notification workflow when a new document is filed in or removed from the folder
Custom Properties
Loan ID
Customer object
Document Class
sub-class of
sub-class of
Loan Application Class
System Properties
Date Created
Created by
Versions
Folders filed in
Content Elements
....
Default Security
Lending
Event Subscriptions
Launch "New Loan Document" workflow when new application added to the object store
Custom Properties
Customer
Application Type
Status
Versionable: No
Storage Location
File Store
Loan Policy Class
System Properties
Date Created
Created by
Versions
Folders filed in
....
Default Security
Marketing
Event Subscriptions
Launch policy approval workflow when major version checked in
Custom Properties
Policy Type
Policy Name
Policy Number
Versionable: Yes
Storage Location
File Store
Custom Object
sub-class of
Customer Class
System Properties
Date Created
Created by
....
Default Security
Lending
Event Subscriptions
Update CRM system if properties are updated
Custom Properties
Company Name
Street
City
State
Zipcode
Phone Number

Because the system leverages object-oriented technology, everything that is managed by the system is stored as an object. This means that there are many additional object types beyond document, custom object, and folder. For example, each custom class that is created (such as the customer class in the example above) is also managed as an object in the system. This means that system capabilities, such as custom properties, custom event actions can also be applied to these objects as well. Typically, however, the document, custom object and folder classes will be the base classes upon which all custom classes are defined.

Application Development and Business Objects

From a development perspective, it is important to further refine the definition of a business object is and how it manifests in software. Business objects can be categorized in the following way:

Solution domain objects define the entities that make up a solution or application. Solution domain objects are understood by the business users, and often map to physical objects in the real world, but may not map to objects in code.

Implementation objects are the objects that are manifested as code, for example a Java class. The following describes examples of implementation objects

> ***FileNet objects*** are implementation objects that are represented as a set of Java classes within FileNet Java APIs. These objects include Document, Folder, Workflow Definition, WorkObject, Class Description and more. These objects are used to manipulate data that is stored in the databases and file systems that are managed by the Content and Process Engines. FileNet tools make it easy to customize the behavior of these objects in graphical user interfaces. For example, as defined earlier in this document, new types of documents which have custom properties and default security can be created without custom programming. In many cases, using the platform objects is sufficient for building applications.
>
> ***Application objects*** are implementation objects that solve specific business needs. These objects are often an aggregation of the FileNet objects and are typically run in the classic “business” tier of a web application as Java objects. These objects may also leverage core application server capabilities, such as JDBC™, and interact with packaged applications or other components built in-house. Example solution domain objects include loan, loan document, and customer. Customers typically create application objects by creating new Java classes or sub-classing the Java classes delivered in the platform.

Properties

The properties that are associated with objects can have a single value or multiple values. For example, you can define a multi-valued property named Keyword that contains a list of keywords. Properties also have a type, which can be Binary, Boolean, String, DateTime, Integer, Float, ID, and Object. Object-valued properties are useful for defining relationships between objects. The Customer property shown in the loan example in the previous section illustrates how both the Loan and the Loan Application can point to the same Customer object.

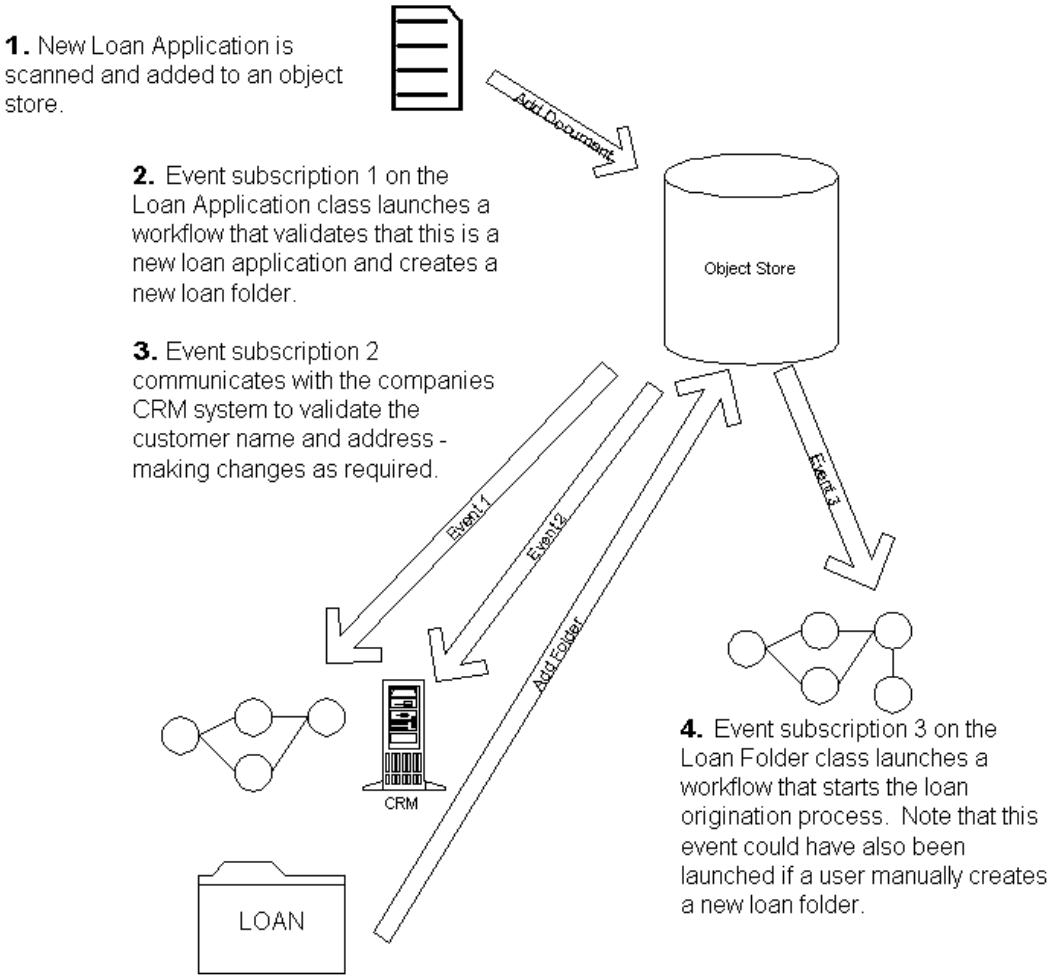
Properties can also be configured to have default values that are set when a new object is created. In addition, the system can be configured to restrict the values for the property to a choice list. A choice list is a list of possible values that the user can select from when assigning a value to the property.

Events and Subscriptions

Events provide a mechanism for initiating actions that are invoked when objects are created, modified, and deleted in an object store. For example, when a document is added to an object store, an "update" event is triggered which launches a workflow for approving the new document and then posting the approved content to a web site.

A subscription is how a particular "event trigger" is associated with an "event action". In the example above, "update" is the event trigger and the event action is the workflow launch. Many different subscriptions could be associated with a particular event trigger.

The following diagram illustrates how several events could be launched when a new loan application is added to an object store.



The system comes with pre-defined event actions, including launching a workflow or an Enterprise Application Integration message and updating the security associated with an object. In addition, events are scriptable, meaning that custom script code, such as JavaScript, can perform any desired action.

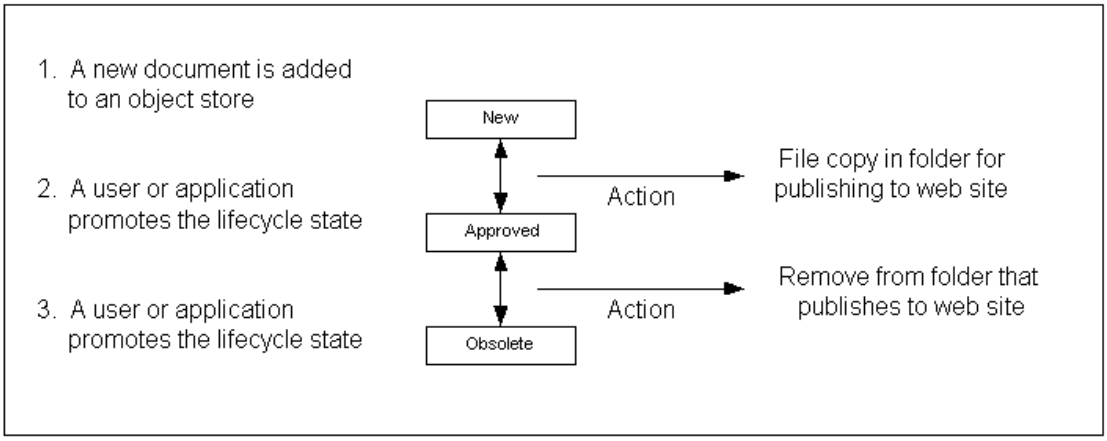
The event triggers for each of the object types are summarized in the table below. Note that "Others" refers to all other base object types which are managed in an object store, such as "Class."

Trigger	Document	Folder	Custom Object	Others
Create	X	X	X	X
Update	X	X	X	X
Delete	X	X	X	X
Checkin	X			
Checkout	X			
Promote to a major version	X			
Demote to a minor version	X			
Classify complete	X			
Add containee		X		
Remove containee		X		

Subscriptions can be associated with a class, so that the event applies to all objects in the class or subclass, or with individual objects. Event subscriptions can be run synchronously or asynchronously. Synchronous events participate in the server transaction which generates the event, so your application can affect the success or failure of the server operation. For example, a synchronous event might be applied to a Claim folder class that returns an error if a document that doesn't belong to the Claim Document class is filed in the folder.

Lifecycles

Document Lifecycles allow administrators to define a sequential set of states that a document will go through over its lifetime, as well as the actions that are triggered when it transitions from one state to another. A user or application can "promote" or "demote" an object to move it forward and backward in its lifecycle. The following diagram illustrates a simple lifecycle that files a document into a web folder after it is approved and then removes it from the web folder when the document enters the obsolete stage.



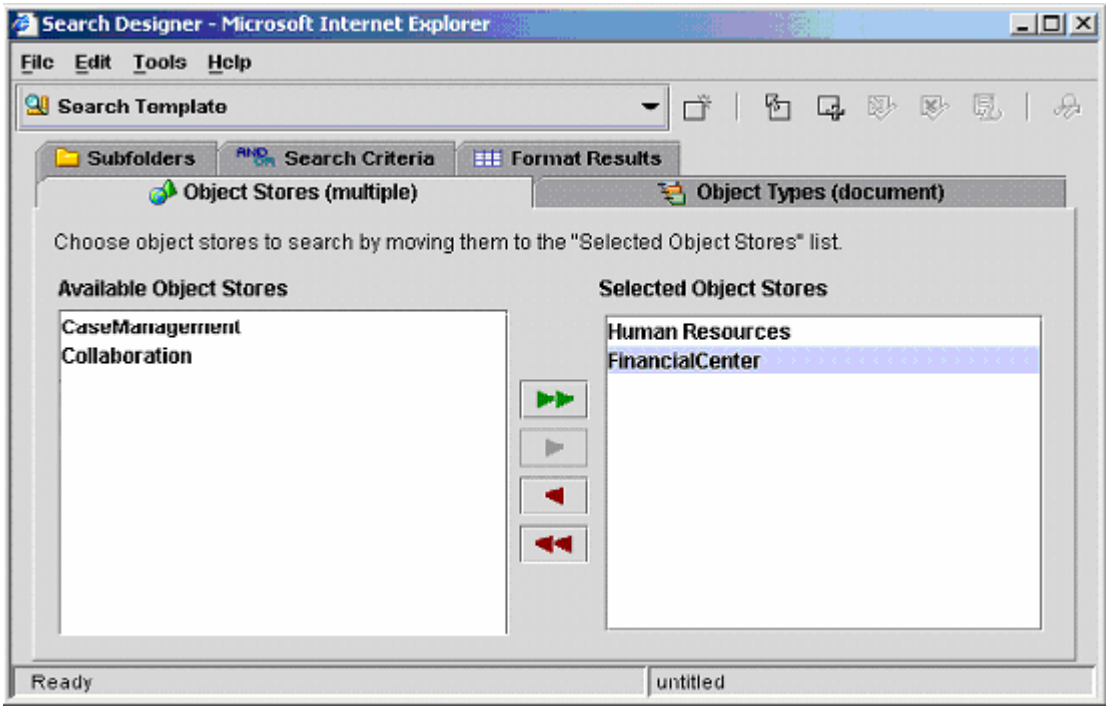
Search

The Content Engine supports property and content-based searching. Key capabilities of search include the following.

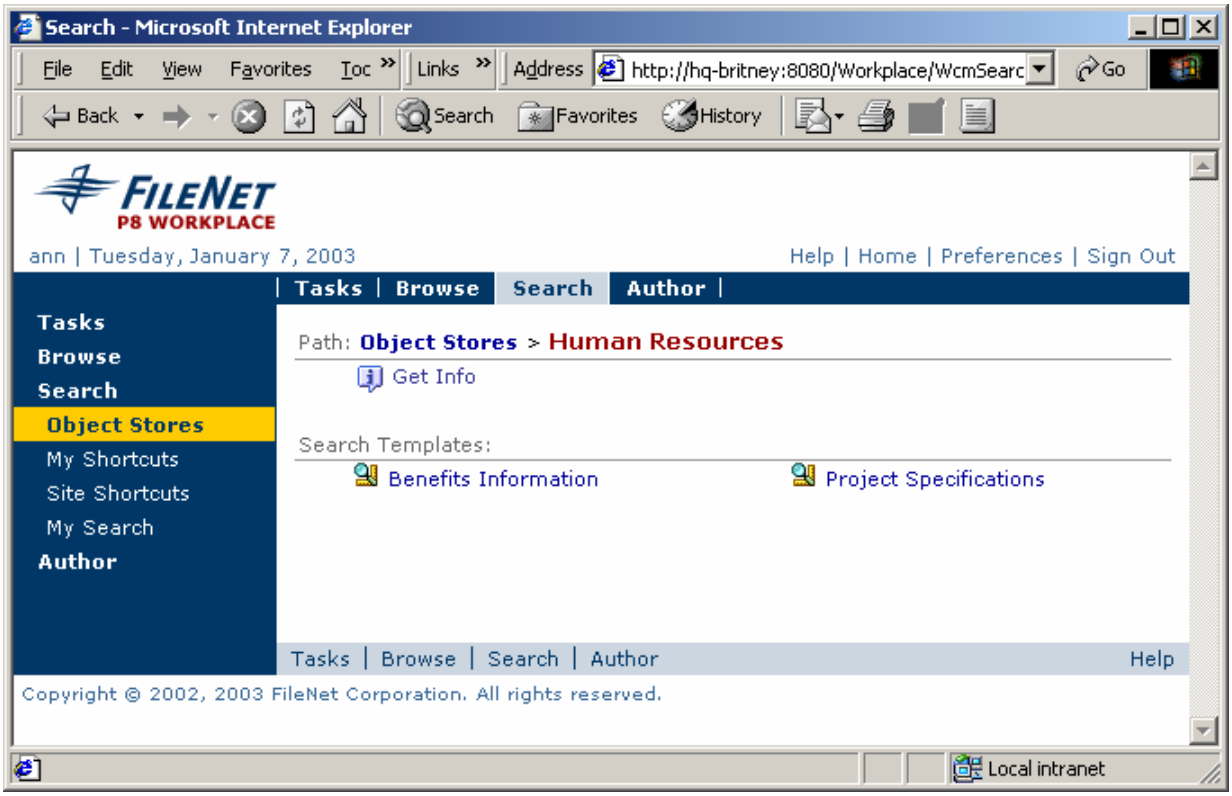
- A single search can span multiple object stores across multiple databases.
- Documents, folders, and custom objects can be searched for in Workplace, the out-of-the-box end user application.

- Content-based searching leverages the Verity search engine, and supports extensive content search capabilities that account for misspelled words, typographical errors, phonetic searching, stemming, synonym expansion, and wildcard searches.
- When a content search is performed, both property and content search hits are returned.
- Content searching can be configured to return a fragment of the content for each document in the search result.
- Search results can be ranked by relevancy.
- Bulk operations can be performed on search results in the administration tool, where the operations can be scripted or selected from a set of pre-defined operations such as delete, cancel checkout, file, unfile and change security.
- Stored searches can be created and saved for easy execution of common queries.
- Stored search templates provide a simple user interface for users to enter search criteria.
- Shortcuts to searches can be saved for easily finding them later.

The following screen shot shows the Search Designer tool that is used to create stored searches and search templates.



The following screenshot shows how searches appear in the Workplace Search page.



Versioning

Content can be versioned to maintain a history of changes and to control who can change the content at a given time. The Content Engine supports a two-level versioning scheme, where a document version is either a major or minor version. Minor versions are typically used to denote a document that is "in-progress," whereas a major version is typically used for documents that are complete. In addition to version numbers, the system maintains a state property that defines the current state of each version of the document. The states are:

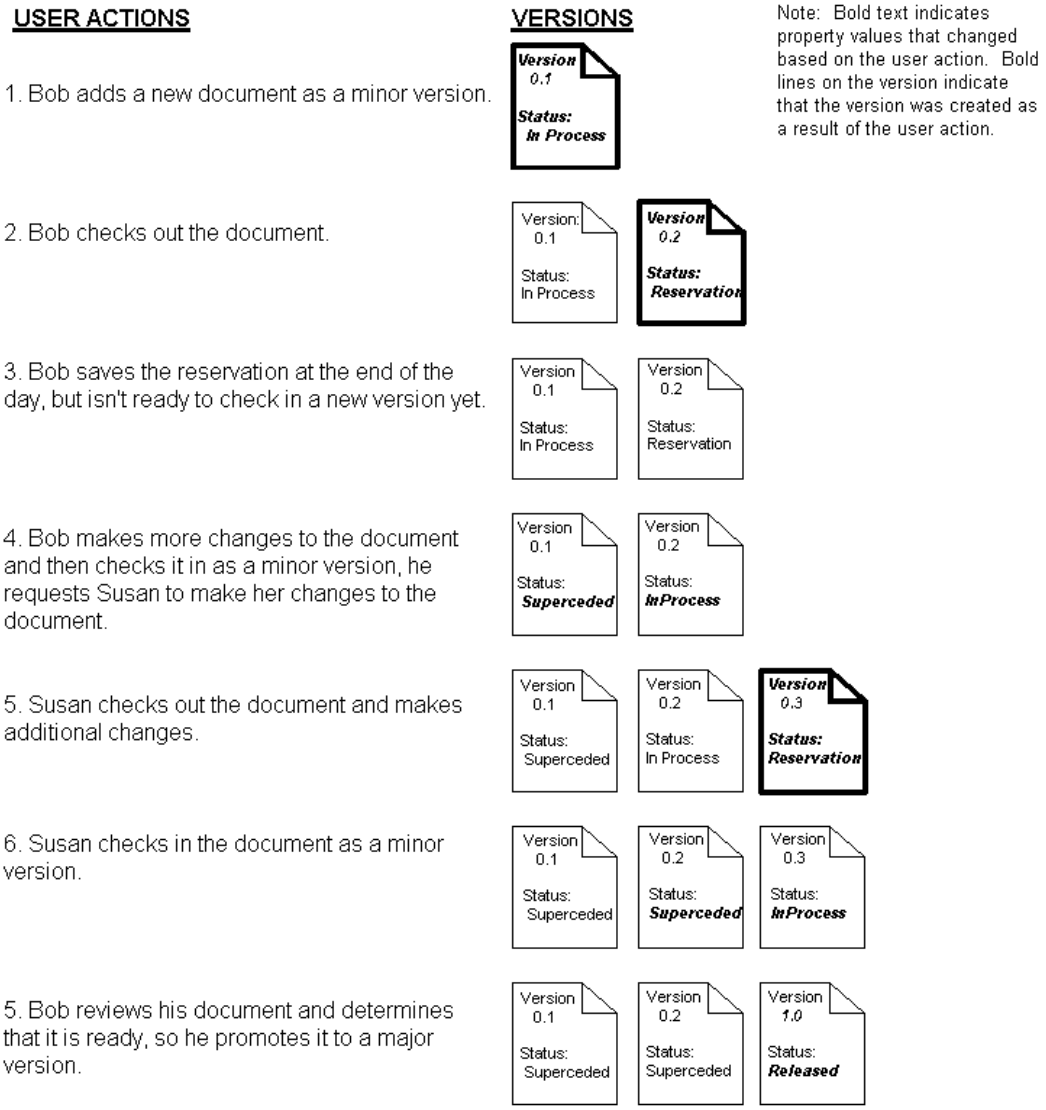
In Process – The version is a work in progress. Only one version can be In Process.

Reservation – The document is currently checked out for modification. Only the latest version can be in this state.

Released – The document has been released as a major version. Only one major version can be in this state.

Superseded – The version has been superceded by another version. Many versions may be superceded.

The names associated with these states can be configured to more closely match their document management processes. The following graphic illustrates how two-level versioning works.



Additional capabilities provided in the versioning model include the following.

- The system can be configured to apply security policies that automatically apply different access rights for major and minor versions, making it easy to enforce a different viewing audience for in-progress documents.
- A document can be promoted from a minor to a major version without requiring the content to be versioned.
- A document can be demoted from a major version to a minor version, which is useful if the document has incorrectly been promoted to a major version.
- As illustrated above, a document can be saved to the repository prior to checking it in, avoiding having users keep content on their local systems and allowing multiple users to work on a checked out document.
- Versioning can be enabled and disabled per document class, for cases when multiple versions are not required.
- A version can be frozen so that the custom properties associated with a version cannot be changed.
- A user can view all versions in the end user and administrative user interfaces.
- Versions can be deleted in the administrative tool.

Classification

Classification is the process of assigning metadata to content, specifically the selection of a document class and property values. Classification can also be performed by filing objects into folders that define classification taxonomies. Classification can be performed by an end-user, an application that uses the FileNet APIs, or automatically using the content-based classification capability provided in the platform.

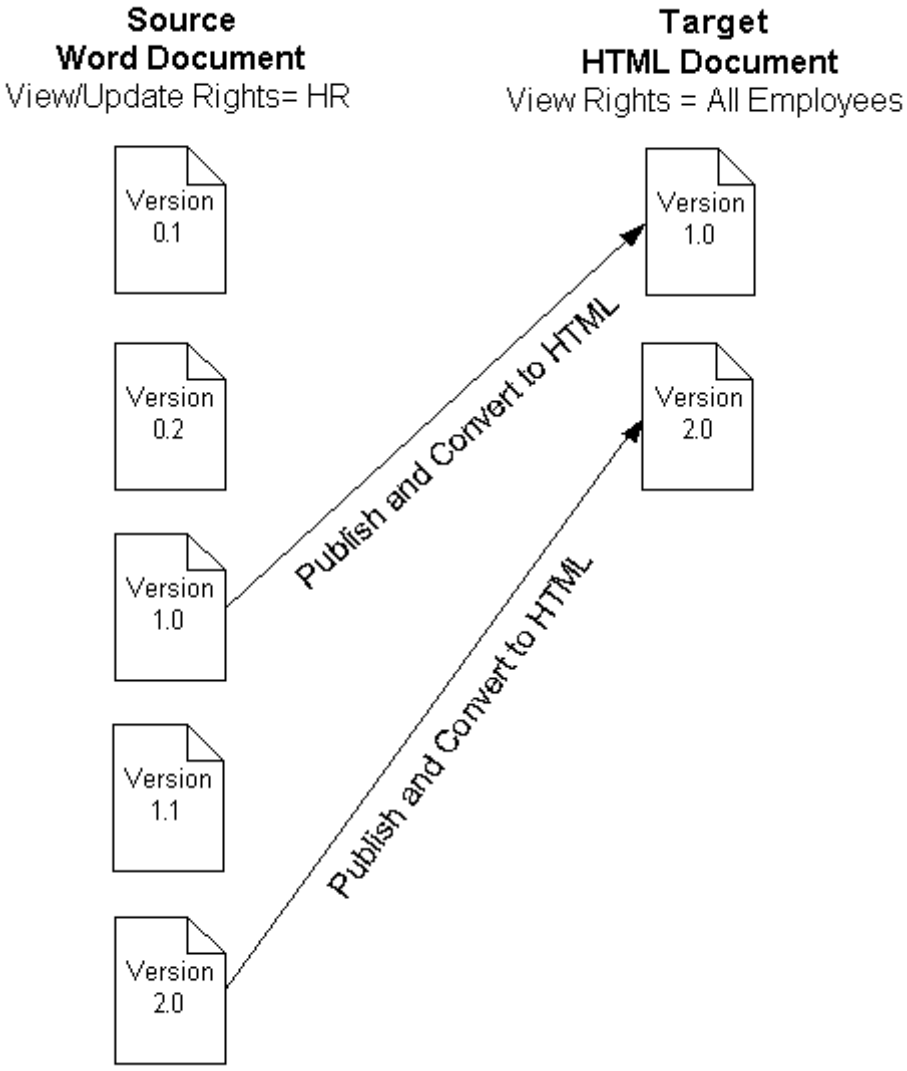
Entry templates, described in detail below, can help automate the end-user classification process by filing the document into pre-specified folders and by pre-defining the object's class and property values.

Automatic classification is a capability that classifies an incoming document by examining its content. FileNet supports automatically classifying XML documents, though custom classification plug-ins can also be created for any document format. For XML classification, administrators create mapping scripts that associate XML tags in the incoming document to properties, thus enabling the automatic classification of any XML document.

Renditions and Publishing

The FileNet Content Engine supports the translation of documents to PDF and HTML, making it easy to publish content in formats suitable for the web and printing. The rendition model supports creating as many renditions of a particular document as desired, where each rendition can have its own set of properties and access rights. Having separate access rights makes it easy to define a different viewing audience for different renditions.

For example, a benefits document is maintained by employees in the Human Resources department. Over the year, the document may be versioned many times, but once a year, an HTML rendition of the document is created and made available to all employees.



The publishing model supports the following capabilities.

- The relationship between the source document and its renditions is maintained by the system, and re-creating the rendition can automatically replace or version the existing rendition, depending on the application requirements. In addition, the system can be configured to automatically delete a rendition if the target is deleted.
- Style templates allow administrators to specify custom behavior when creating a rendition, for example, you can use a style template to create a watermark on a PDF document or specify the password in the PDF document to control who can print the document.
- Publish templates allow users to define characteristics of target renditions, including:
    - Where to file the rendition
    - Access rights associated with the rendition
    - Metadata values, or that the metadata values are the same as the source
    - What happens when the document is re-published, such as whether or not a previous rendition is versioned or replaced

    - Custom script (in the form of an event action) that is executed after the rendering has been completed, providing an easy mechanism to customize the behavior without writing a plug-in
- Using the FileNet APIs, programmers can create an XML document that defines an "assembly" or list of source documents that are converted into a single PDF target document.

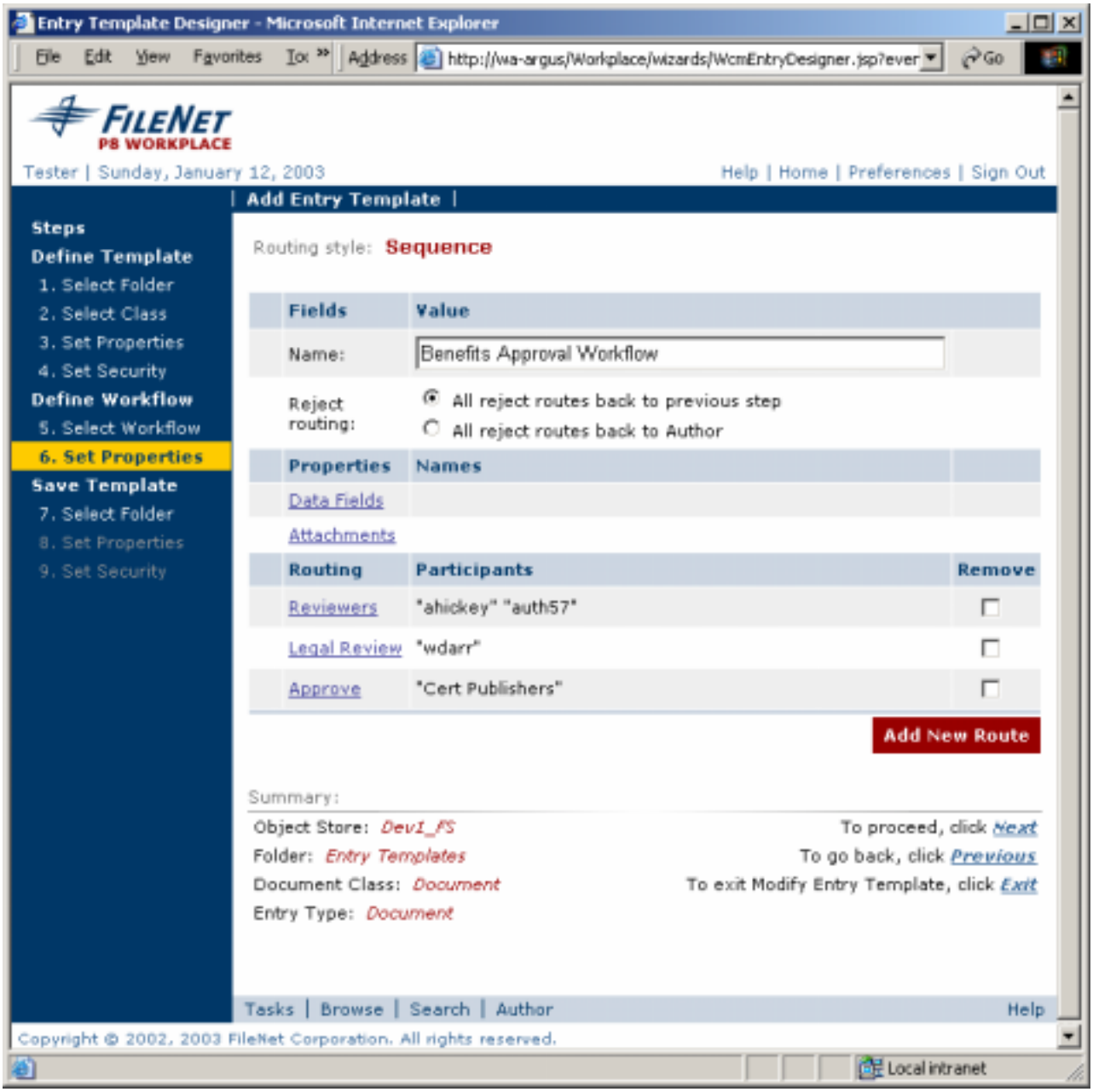
Entry Templates

Entry templates make it easy for users to add documents, folders and custom objects to an object store. Entry templates also make it easy to define approval workflows for these objects.

For example, a manufacturing company may create a set of entry templates for the various types of engineering specifications that are managed in the repository. The entry templates in this example pre-define the document class, all property values except the document title, the access rights and an approval workflow. When using the entry template to add a document to the repository, the user sees a simplified wizard that limits the number of steps and provides a more controlled entry process which reduces the chance of invalid data.

Entry templates are created in Workplace, typically by a relatively small set of users, and are typically used by a much larger number of users. Entry templates provide the following key capabilities.

- Documents, folders and custom objects can be created with entry templates.
- Entry templates can be created by users who are not administrators. For example, a project manager may create the entry templates that her team uses.
- Entry templates can pre-specify the folder where the object will be filed, either prevent or allow the end user to change the folder, and restrict the user to select a particular folder or its sub-folders.
- Default property values can be specified in an entry template, and the template designer can elect to show or hide each property to users who use the template.
- Entry templates can specify whether or not a document should be added as a major or minor version and can specify whether or not a user can change this setting.
- Entry templates can be set up to automatically classify the document based on its content.
- Entry templates can specify the access rights for the object, and the designer can elect to hide or show the access rights for the user to modify.
- Entry templates support specifying a workflow that will be launched when the user creates an object with the template, where the workflow is a simple approval workflow that is defined in the entry template wizard or any other workflow created using the Process Designer. For workflows created using the entry template wizard, the user can choose from a workflow with three steps: review, approve, and publish or one with multiple, sequential approval steps. The template designer can pre-specify the participants or let the user do so when using the template. The following diagram shows the user interface for defining a sequential approval workflow. Note that multiple steps (Content Review, Legal Review, and Approve) have been creating using this wizard.
- Entry templates can serve as placeholders for documents that a user provides while processing a workflow step. When the user clicks on the entry template in the Workplace step processor, the entry template wizard prompts the user to add a document and the new document replaces the entry template attachment.

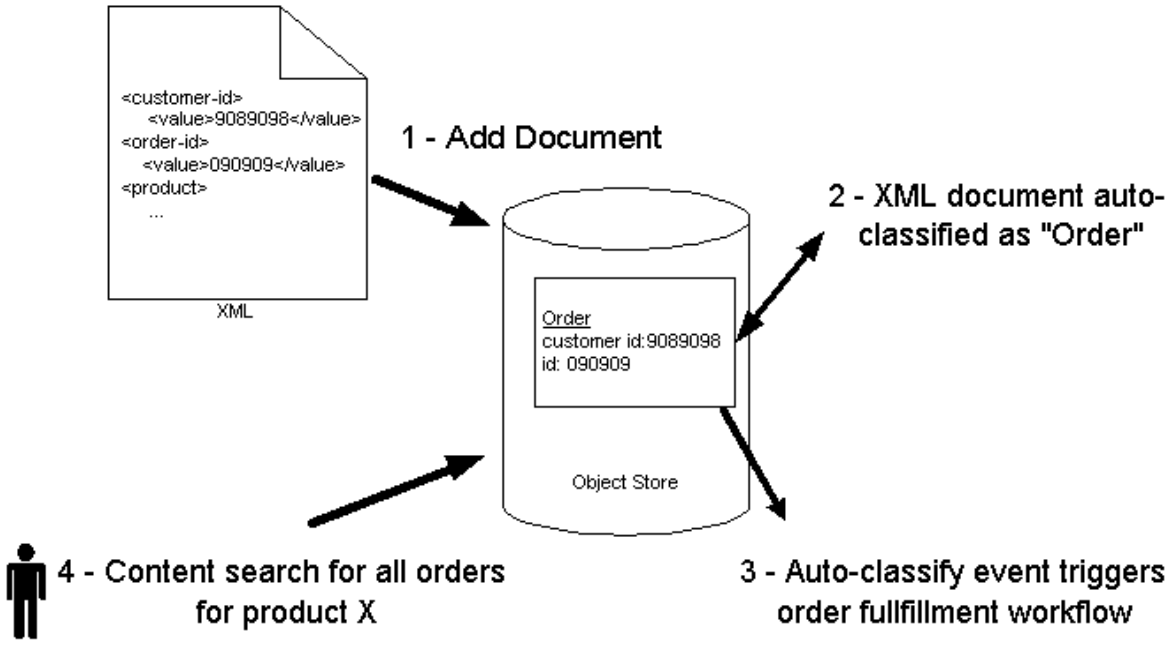


Managing XML Content

The Content Engine manages XML content as documents, and therefore XML documents can take advantage of all of the repository services described above – including metadata, versioning, events, lifecycle, etc. Additional functionality provides XML specific capabilities, including automatic classification and schema validation and content-based searching that filters based on a XML tag.

For example, as shown in the diagram below, a XML document containing information about a customer order is entered into an object store. Automatic XML classification is used to extract the customer id and order number from the XML and to change the class to “Order.” An auto-classification event subscription automatically launches a workflow that fulfils the

order. Users of the system can easily find all orders for a particular product by searching for documents that belong to the "Order" class and where the "Product" tag contains the product.



Content Storage and Caching

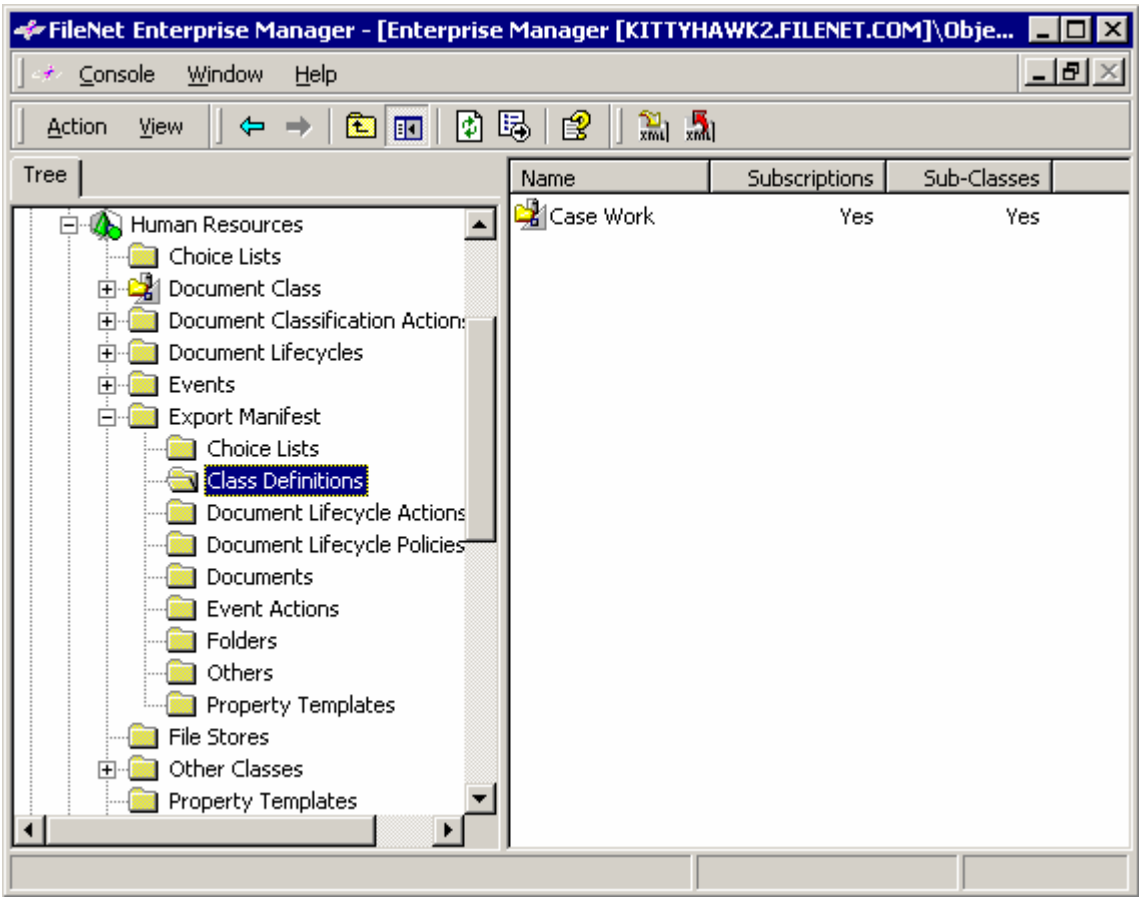
The Content Engine supports storing content in a file system or in the object store's database. From the user or programmer perspective, the storage location is typically transparent and is defined based on object store or document class configuration.

Both file and database content can be cached on Content Engine servers, allowing for quick retrieval of frequently used content.

Import/Export

The Content Engine provides an import and export capability for populating an object store, moving objects from one object store to another, and transferring objects to other applications. The export format is defined by an XML schema so that integrators can easily create import files and use XSL to do data transformations if needed.

In the Enterprise Manager, an administrator can select the objects to export. Dependencies between objects are detected so that all related objects can also be exported in the appropriate order for import. For example, if a folder is exported the user can also choose to export all documents in the folder without selecting the documents individually. The folder will be exported first, followed by the documents. The following screenshot shows the "export manifest", which is a list of all of the objects that the administrator has requested to export. The user can view and modify this list, and then perform the export operation which copies the data to an XML file.



In addition, scripts can be run to perform additional customization during the import process. For example, you may want to update the access rights associated with the new document as it is imported. Scripts can run for each object imported or at the beginning and end of the import process.

The system can be configured to import automatically when a new object store is created. This is useful for pre-populating the object store with any required classes or objects. For example, an administrator might define a set of properties, such as “Employee ID” and “Department”, which must be consistent across all object stores in the enterprise. These can be defined in a single object store and then exported to an XML file. The administrator can then configure the Content Engine to automatically create these property definitions every time a new object store is created.

In addition to the generic Import/Export capability provided in the Enterprise Manager, FileNet provides a tool that can be used to import FileNet Content Services objects into an object store.

Virtual Content Management

The Content Engine supports the creation of objects that reference content stored outside of an object store. For example, you can create an external document that points to content that resides in Images Services. This allows you to aggregate and manage content that is not stored in an object store.

In addition, Workplace supports the registration of external services that are used to retrieve the content. This provides a plug-able mechanism for displaying the content to an end user who is using the Workplace application.

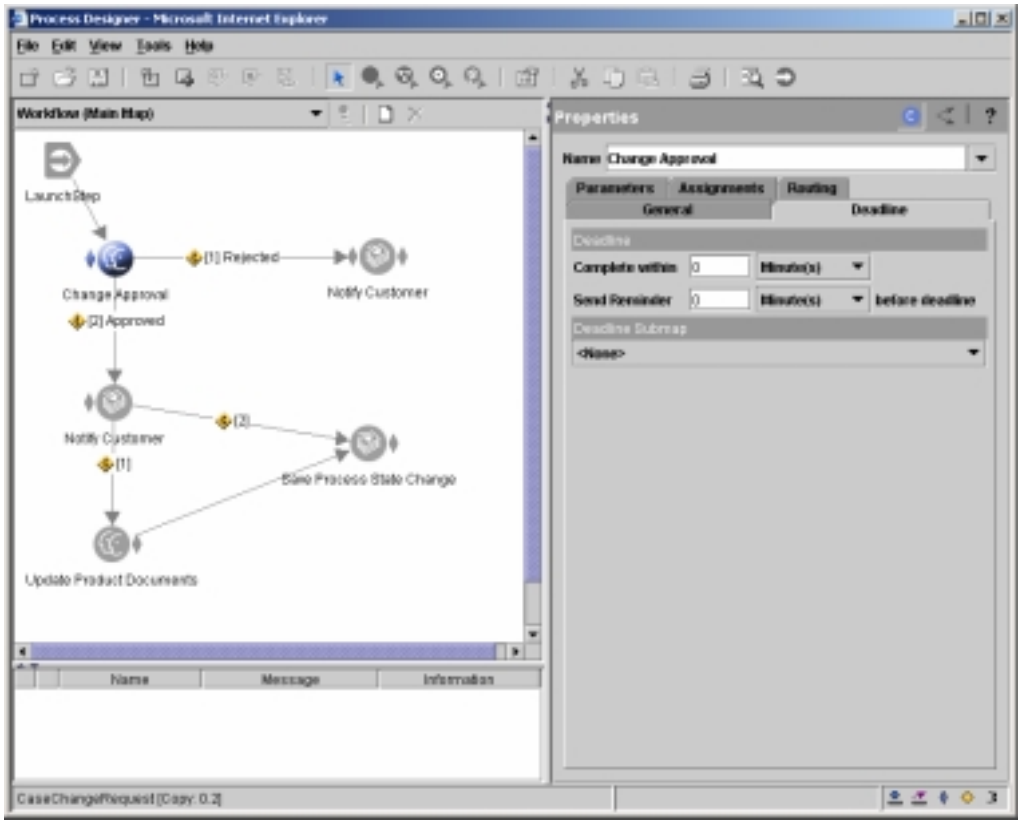
Process Management

The FileNet P8 architecture lets you create, modify, manage, analyze and simulate business processes that are carried out by applications, enterprise users, and external users such as partners and customers.

Graphical Process Design

Workflow definitions graphically define the activities and resources required to accomplish a business process. The workflow definition acts as a processing template that is used each time the workflow runs, routing the work to the specified participants, along with the data, attachments (documents, folders and custom objects), and other information they need to complete the activities.

The following screenshot shows the graphical user interface for creating workflow definitions.



The graphical Process Designer application allows you to perform the following tasks.

- Create steps and routes using drag-and-drop.
- Define data fields that may be required while the process is executing, such as a loan id or customer information.
- Create placeholders for content related attachments, including Documents, Folders and Custom Object that users may need to view or modify during the process.
- Define expressions that control routing and can be used to set data field values.
- Specify users and groups who may participate in each step, including the ability to specify a user's role, such as the user who initially launched the workflow.
- Specify visibility of data fields and attachments for users who participate in a step.
- Create submaps that simplify the workflow graph and support reuse by calling the submap from multiple steps.

- Pre-define steps for commonly required tasks, such as launching another workflow, waiting for another workflow to complete, and setting timers.
- Specify a programmatic component that will be executed for a step.
- Define milestones at key points in the workflow which are used to monitor progress.
- Set up deadlines for when a step must be completed.
- Validate the workflow and launch for testing.

Work Management

Work management provides users with a set of tasks that they need to perform. Work is managed in queues, which are database structures that hold work items. There are several types of queues. User queues hold work items waiting to be processed by a specific user. Work queues hold work items that can be completed by one of a number of users, rather than by a specific participant, or work items that can be completed by an automated process.

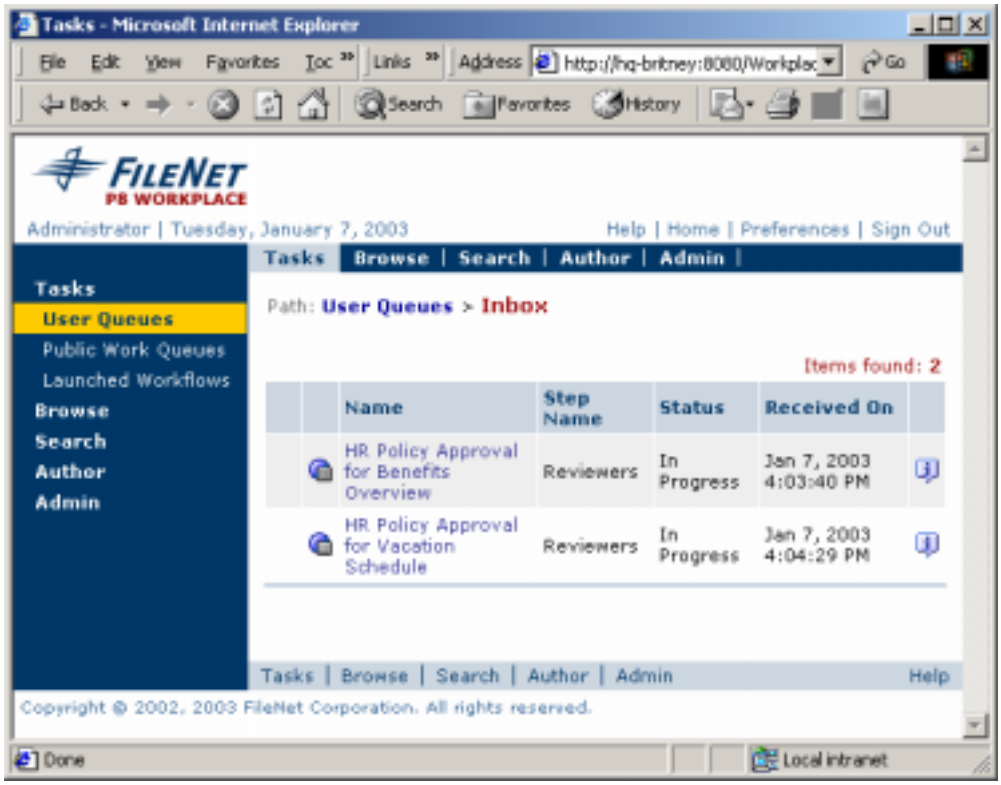
Other queues are used by the system and applications. Component queues hold work items that can be automated via external components such as Java classes. System queues hold work items that are undergoing or waiting for certain processing by the Process Engine software.

Parallel Work and Routing

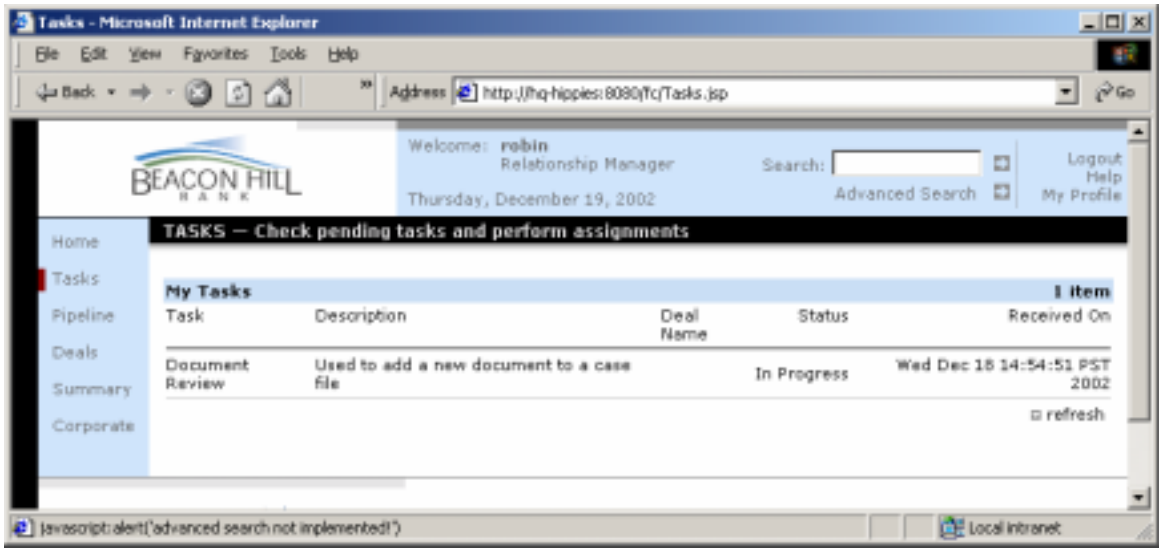
Routing defines the order of execution for a series of steps. With the exception of the last step on the map, every step has one or more routes leading from it. You can define a route so that it is always taken or is taken only if a pre-defined condition is true. Workflow steps can occur in parallel to facilitate more efficient processes.

Task Inbox and Workflow Tracking

The Workplace application and Portal Integrations provide out-of-the-box user interfaces that allow users to process their work items, view workflow milestones, examine workflows that they've launched, and track any workflows that they have the access rights to track. The following screenshot shows a user's task list.



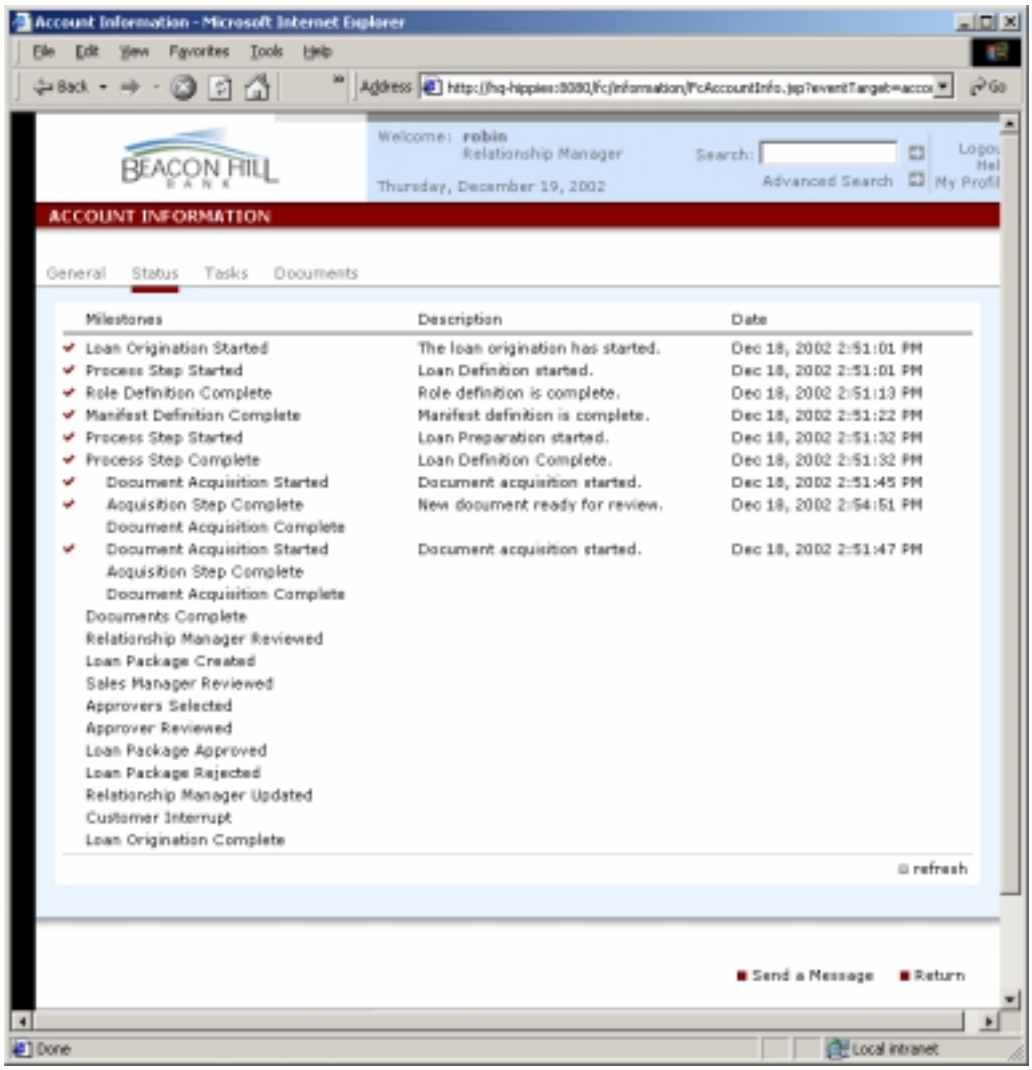
In addition, custom applications can be built which present and filter a user or group's work. The following screenshot shows the Commercial Lending Solution Template inbox.



Milestones

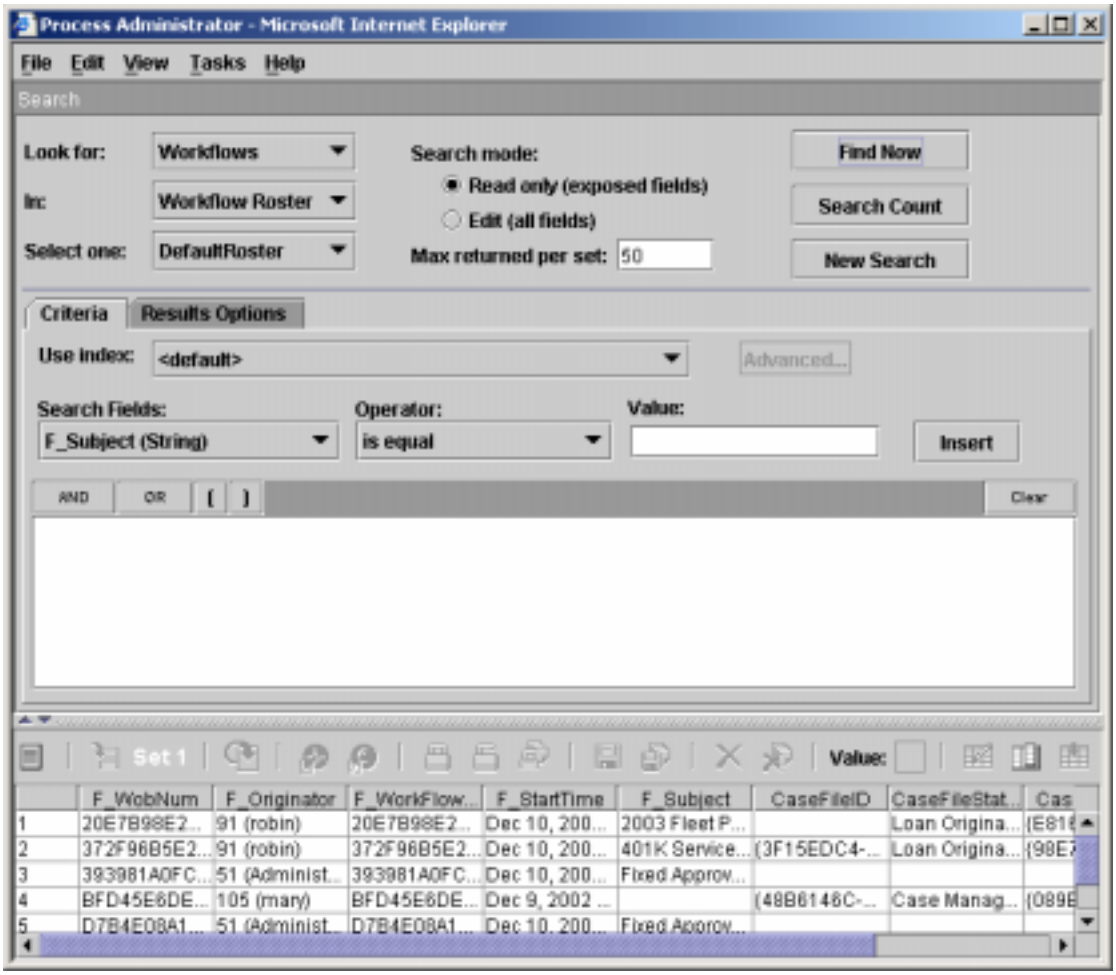
Milestones provide a way to expose the status of a workflow to users who do not need, or should not have, visibility into every step that makes up a workflow. For example, during loan approval, different milestones may be shown to the customer and the loan officer.

The following screenshots show how milestones are used in the Commercial Lending Solution Template.



Search and Monitor Work in Progress

A graphical tool provides advanced searching capabilities for monitoring and managing running processes. This tool which is accessed from Workplace is shown in the screenshot below.



Deadlines

A deadline provides a time-based scheduling constraint which requires that a step or workflow be completed within a certain amount of time. The deadline can be made relative to the time the step was routed to the participant or to the time the workflow was launched.

Email Notification

Users can be notified by email when process-related events occur. An email can be sent:

- When a new task is assigned
- As a reminder for completing a task
- When a deadline has expired

Users who track workflows can be notified when

- Workflow exceptions occur
- When a step has reached a deadline
- When the tracker has been assigned a task

Users can specify their individual notification preferences in Workplace.

Process Analysis and Reporting

The FileNet Process Analyzer supports analyzing processes to:

- Determine cycle times for your workflow-enabled business processes.
- Pinpoint bottlenecks that negatively affect production and service levels, costing you time and money.
- Increase the return on investment of your workflow systems.

The system provides extensive analysis capability by allowing you to:

- "Slice and dice" the collected data to isolate problems and have direct control over the data elements being reviewed.
- Generate chart-based reports on statistical information gathered by the Process Engine.
- Create and save custom charts for future use.

FileNet leverages OLAP (On-Line-Analytical Processing) technology to provide process analytics. OLAP is a database technology that is optimized for querying and reporting, enabling fast analysis of multi-dimensional data. Microsoft® Excel provides the user interface for interacting with the data. Excel provides extensive charting capabilities with direct access to the OLAP database. In addition, Excel provides a low-cost-of-ownership solution and a familiar user interface for analysts. FileNet provides a set of out-of-the-box reports that provide information on:

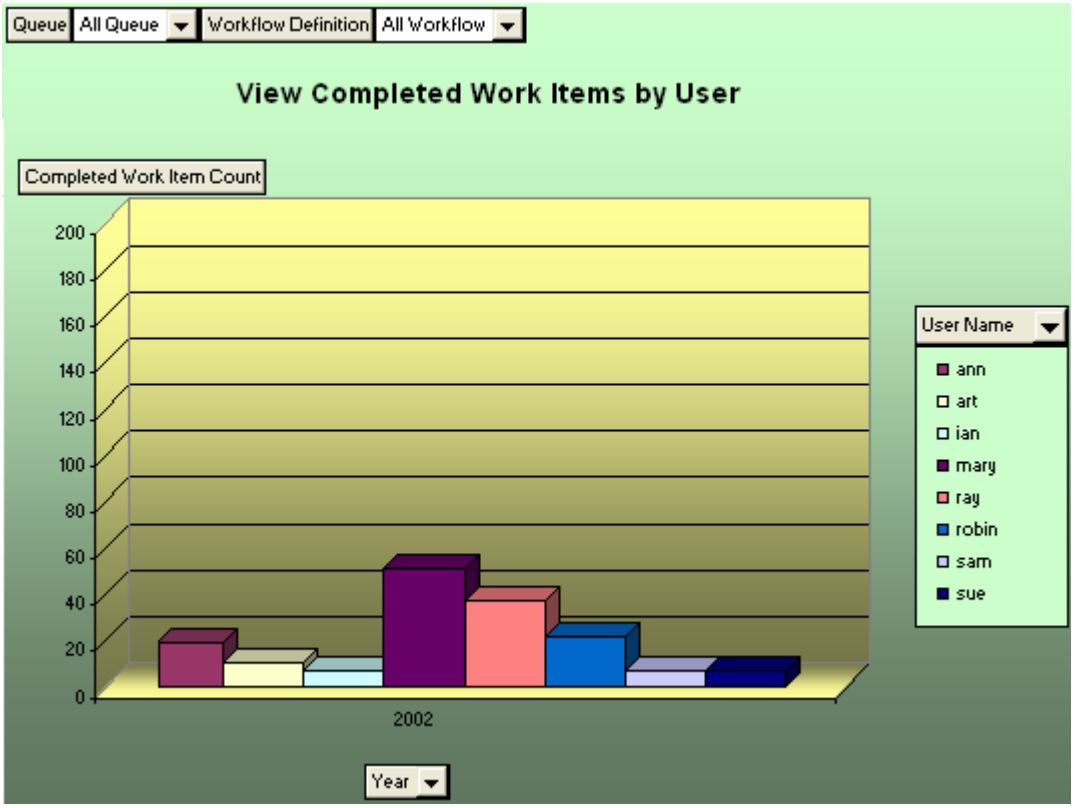
Productivity – measures the type and number of tasks processed

Cycle Time – the average process time for a specified time interval

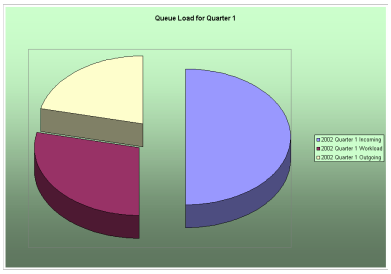
Queue Load – the number of work items in a particular work queue

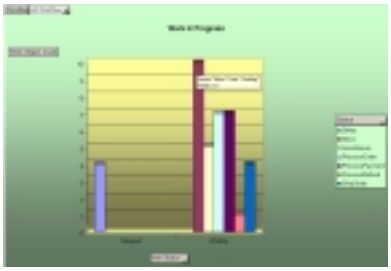
Work in progress – a real-time view of the number of currently running workflows and work items in a selected queue

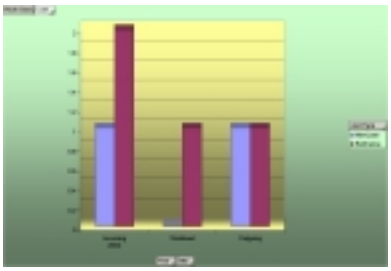
Users can extend this reporting functionality by gathering business-specific process data and modifying the reports that FileNet provides. The following report graphically shows the amount of work completed by each user.

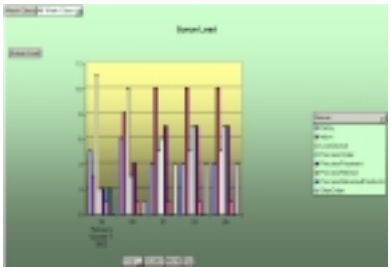


The same historical data can be viewed or “slice-and-diced” in many ways. The following four charts show the same historical data in a variety of ways.





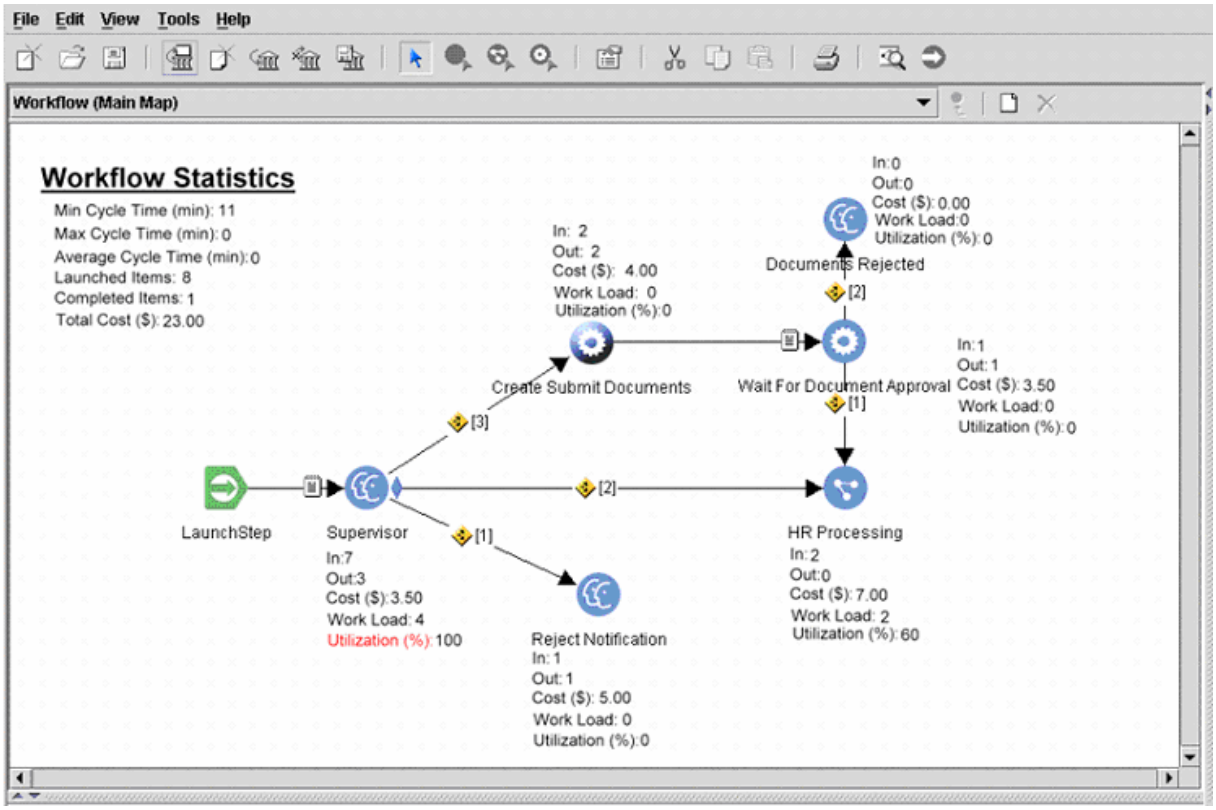




Process Simulation

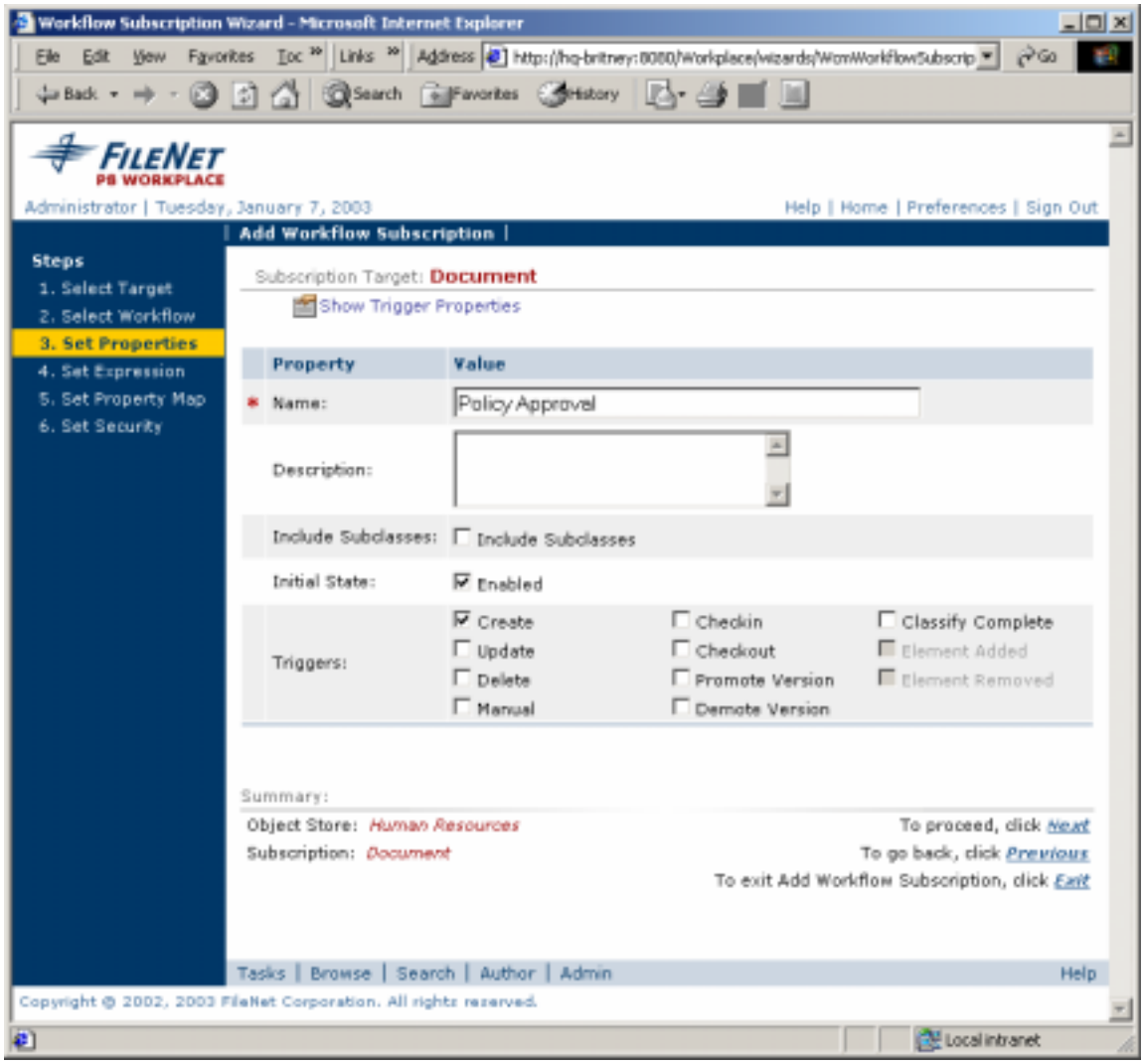
Taking analysis one step further, simulation allows for the further refinement of business processes by using historical data combined with “what-if” scenarios to simulate and test business processes. An analyst can test drive different scenarios that could improve the business process before changing the process in a production environment.

Analysts create scenarios using the Scenario Designer – a tool that leverages the same user interface paradigm as the FileNet Process Designer. A scenario specifies parameters that are used to simulate the workflow, including timeframe, work arrival patterns, resource allocation, job duty creation, costing metrics and work shift creation and assignment. Scenarios are saved into an object store so that they may be executed and refined over time. The following shows a workflow animation that illustrates the results of a simulation.



Event-based Workflow Launching

Workflows can be automatically launched when objects in an object store change. For example, if a new customer object is created, a workflow that manages new customer acquisition can be automatically launched. As shown in the screenshot below. Workplace provides a graphical user interface for setting up event-based workflow launch rules.



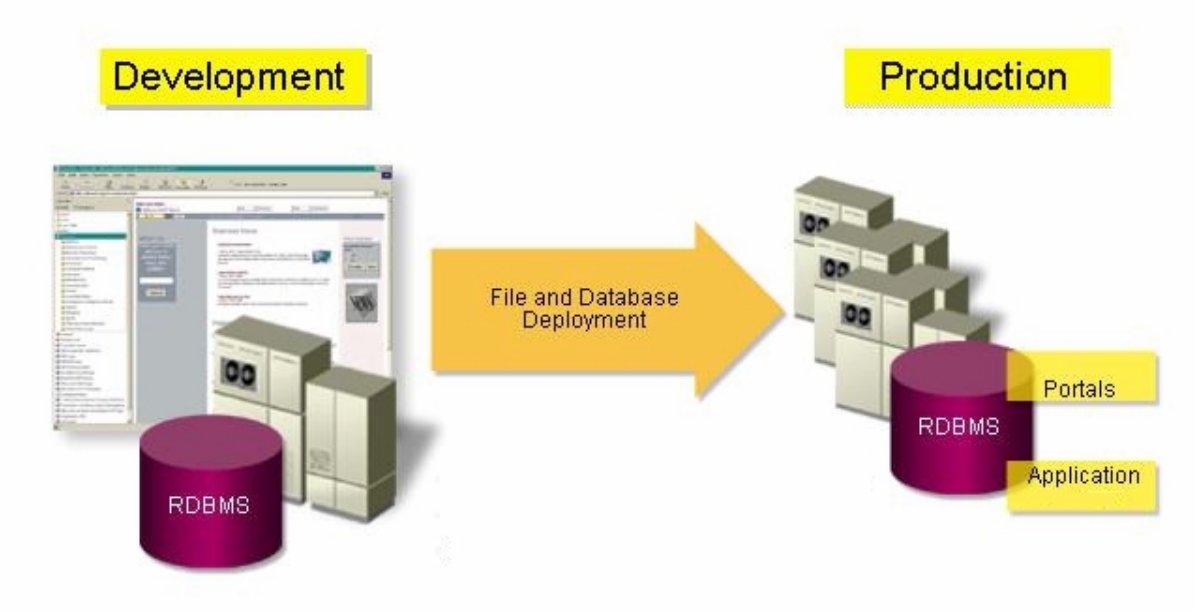
Web Content Management

FileNet's Web Content Manager (WCM) provides robust web content management for the entire lifecycle of your web sites, including:

- Initial development of a web site
- Continuous update of content that provides dynamic and up-to-date information on your site
- Automated and efficient review and approval of content and site structure
- Link management to guarantee that no web site links are broken
- Automatic deployment to one or more production web sites

Separate Development and Production

WCM supports a model that separates site development from the production web site. Sites and content are created and approved using the WCM application, and then the content is automatically deployed to another web server or application that is responsible for delivering that content to internet users. This model supports using the appropriate hardware and software in each environment. For example, a production site with heavy traffic can be scaled out to meet the large number of user requests. This model also supports creating highly dynamic sites that leverage portal servers, application servers as well as more static web sites.



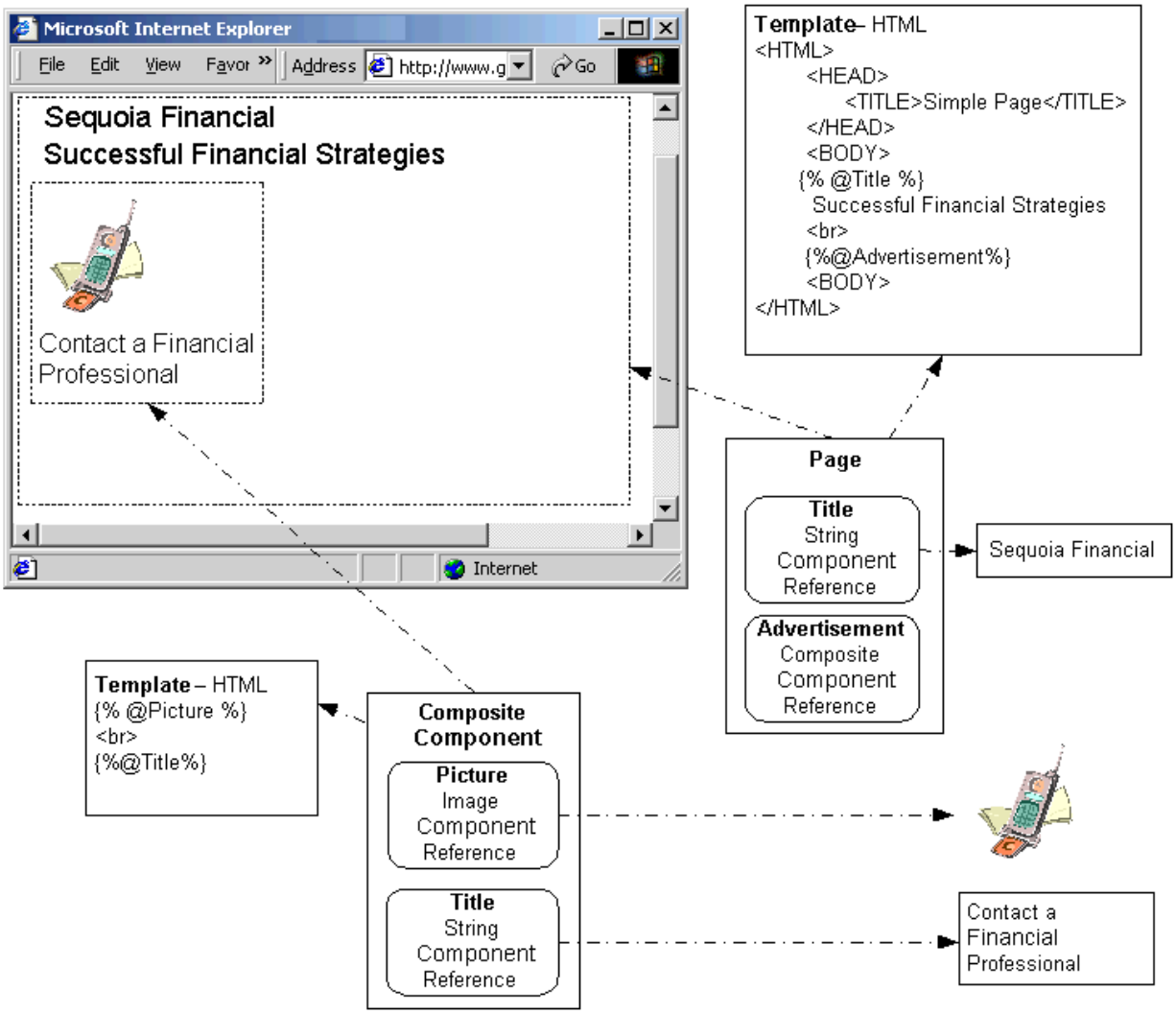
Component Architecture

The Web Content Manager provides a component-based architecture for creating and managing web content. All content is created and managed as individual components, promoting a “create once and reuse everywhere” model.

The Web Content Manager separates web content into format, data, and structure. Each of these parts are created and managed separately to maximize reuse and maintain site integrity. The advantages to this model over more traditional file-based web content management models are:

- Promotes independent and parallel work by web site designers, content contributors, programmers, graphic artists, and site administrators. Users focus on their respective tasks, for example content contributors don’t have to worry about site structure and webmasters don’t have to worry about site content.
- Enables fast and flexible modification of a web site’s look-and-feel without affecting content.
- Promotes reuse. For example, by including a reference to a component instead of a graphic, the graphics file need only be created once and reused everywhere. Any changes to the graphics file are automatically propagated across the site without any manual updates.
- Guarantees link integrity and provides timely updates to changes in dependent pages.

The following diagram shows how a simple web page is divided into components.



The page contains two components: Title and Advertisement. The page is associated with a template that defines how the data on the page is formatted. Templates can be HTML, XML, or any other presentation language that can be interpreted on the production web site. The Advertisement component is actually a composite component or "mini-page" that contains a graphic and a Title. This model supports easy reuse of components, such as the Advertisement, across the site.

Integrated Content Management

Web content is managed by the Content Engine, and thus the Web Content Manager leverages the robust content management capabilities offered by that engine, including:

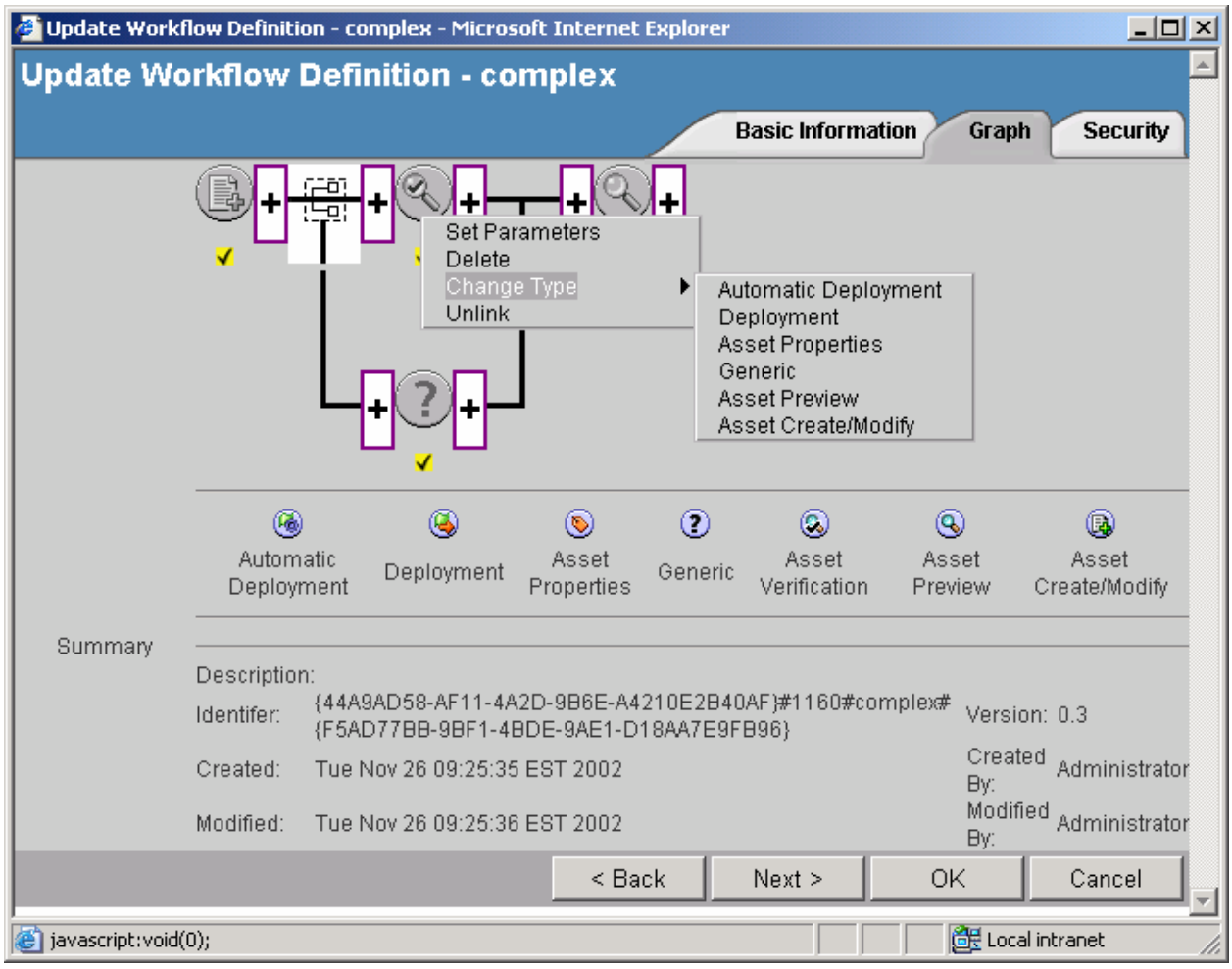
- Management of unstructured and structured documents
- Versioning and change history
- Rich metadata model
- Search
- Security
- Server side events
- Automatic content classification

- Scalable, distributed architecture

In addition, because content is managed in object stores, you can easily leverage content created across the enterprise on your web sites. For example, documents created in HR can be easily made available on a corporate intranet.

Integrated Process Management

Workflow streamlines approval processes and reduces publishing cycle times for web content. The Web Content Manager provides pre-defined approval and publishing workflows that are easily customized by business users to meet an organization's unique approval requirements. As shown in the diagram below, WCM provides a user interface that allows a variety of users with limited process management skills to create and manage approval workflows.



All workflows in the FileNet Web Content Manager are executed and managed by the Process Engine, leveraging the robust and fully-featured capabilities provided by that engine, such as process analytics, reporting and simulation.

Templates

Templates promote a consistent look-and-feel for a web site; freeing content authors from worrying about how content will look on the site and allowing webmasters to enforce the rules and processes necessary to maintain a large, complex web site. In addition, templates enable rapid site development and make it easy to change the site without changing content.

WCM does not mandate the format of a template. While typically HTML or XML, templates can be any language that is supported in a browser or by a web or application server.

Multiple User Roles

Clear separation of the various activities that go into building and maintaining a web site is a critical requirement for the efficient delivery of timely, accurate information to a web site. Content contributors focus on providing the content for a site, freeing webmasters to focus on other important activities such as site monitoring and new site creation.

The following enumerates typical functions that users perform in WCM.

Administrators

- Site administrators control access and perform general administration tasks such as object store creation.
- WCM administrators install and manage WCM development systems.

Site Designers and Business Managers

- Webmasters and Template Designers have overall responsibility for the site, including look-and-feel.
- Business Managers and Analysts define the approval and deployment requirements and workflows.

Graphic Designers

- Designers create the graphic elements associated with the site.

Developers

- Developers programs site interactivity, such as user polls, and perform other customization that requires complex coding.

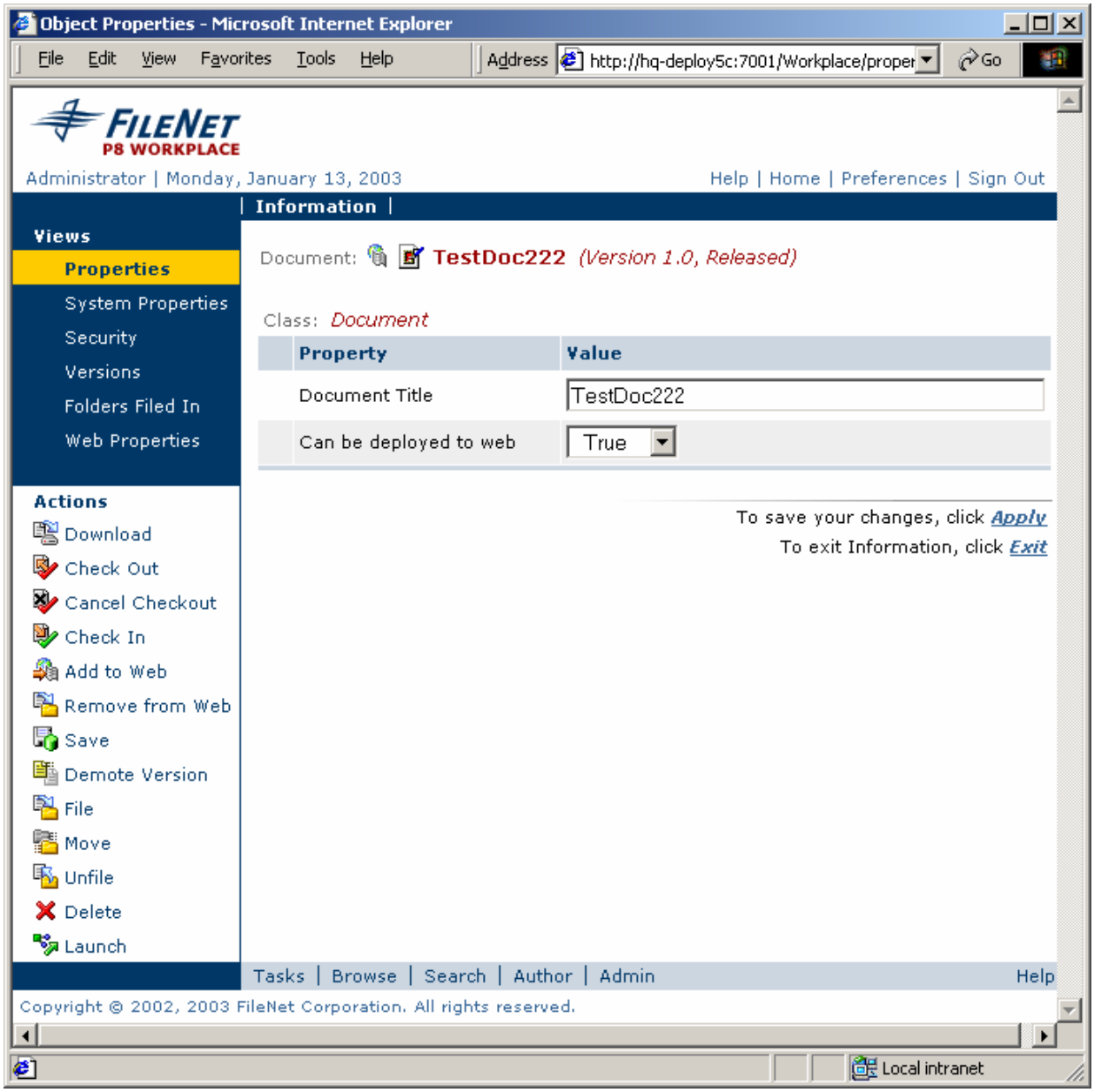
Content Creators and Managers

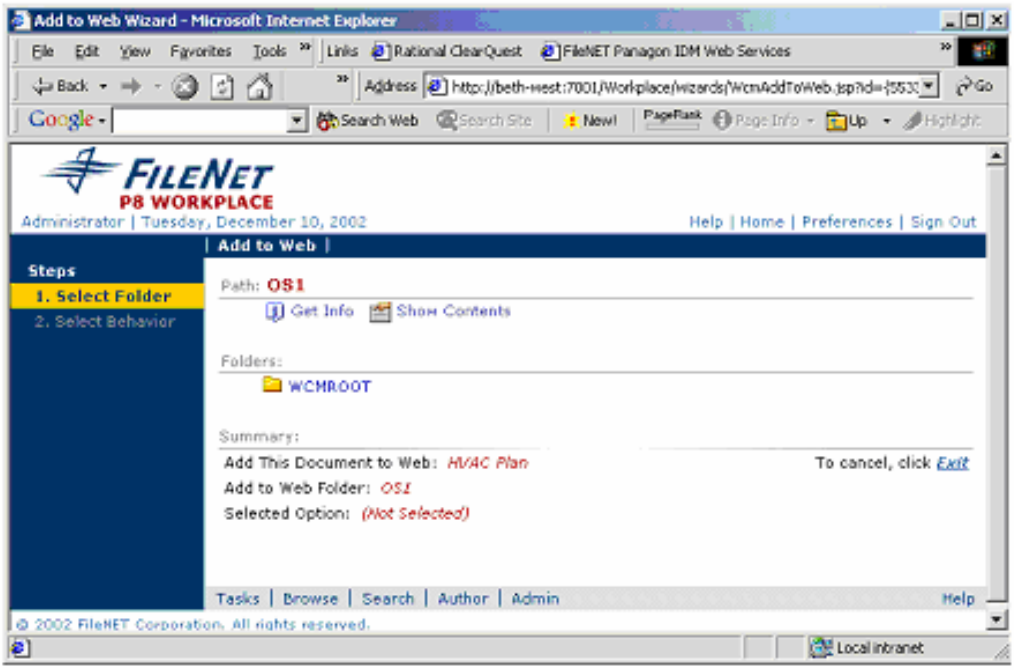
- Content contributors create, review and place content in the proper location on a site.
- Editors review and approve content.

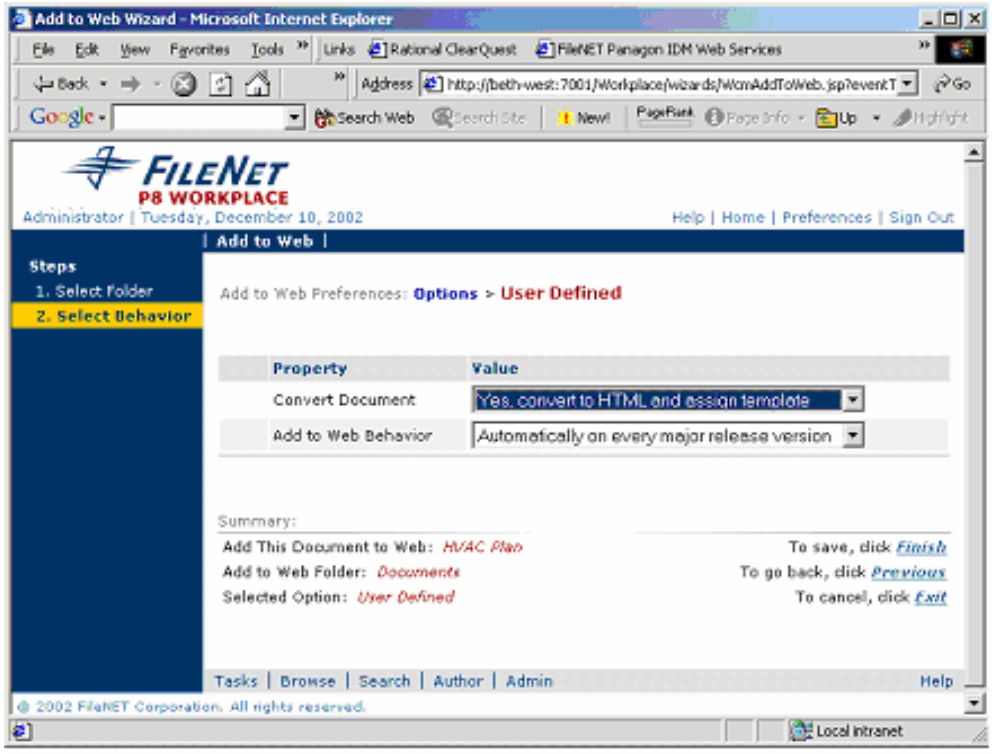
Content Contribution

The Web Content Manager supports contribution of textual and graphic information by non-technical users. Easy-to-use wizard-driven interfaces make it easy for these users to provide content. In addition, users who are familiar with Microsoft® Office can use those tools to add content to a web site and optionally convert the content to HTML.

The following screenshots show how a user in Workplace contributes content to a WCM managed web site. In the first screenshot the user selects the “Add to Web” option from the document’s information page. In the second screenshot the user is prompted for the WCM folder that defines where the content will be placed on the site. The third screenshot allows the user to specify that the document be converted to HTML and specify whether or not new versions of the document should automatically be submitted to the web site for approval and deployment.


Object Properties - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://hq-deploy5c:7001/Workplace/proper
Go
FILENET
P8 WORKPLACE
Administrator | Monday, January 13, 2003
Help | Home | Preferences | Sign Out
Information
Views
Properties
System Properties
Security
Versions
Folders Filed In
Web Properties
Actions
Download
Check Out
Cancel Checkout
Check In
Add to Web
Remove from Web
Save
Demote Version
File
Move
Unfile
Delete
Launch
Document: TestDoc222 (Version 1.0, Released)
Class: Document
Property
Value
Document Title
TestDoc222
Can be deployed to web
True
To save your changes, click Apply
To exit Information, click Exit
Tasks | Browse | Search | Author | Admin
Help
Copyright © 2002, 2003 FileNet Corporation. All rights reserved.
Local intranet





Web Based Tools

The Web Content Manager's web-based tools make it easy for content contributors to be located anywhere in the world, and to contribute content at any time. The tools are targeted for use by both administrators and content contributors.

Deployment

The Web Content Manager supports deploying content to file systems or a database. Many deployment targets can be defined for the same site. Content can be deployed using FTP, file system copies, and database deployment. Database deployment involves pushing content to any number of target database tables. In addition, database deployment supports gathering data from external databases for deployment at the same time that content is deployed.

Image Management

Support for image formats and image-specific capability is a critical component in any enterprise content management application. You can store images directly in the Content Engine and integrate with FileNet Image Services.

Image Acquisition

FileNet Capture Desktop provides the following functionality for getting images and other file types into object stores:

- Scan images
- Import files
- Import FAXes
- Enhance image quality and detect and extract metadata from patch codes and bar codes
- Assemble scanned pages into documents
- Use full-text Optical Character Recognition (OCR) to convert images into Text documents that can be full text searched
- Set metadata and security
- Save to a Content Engine object store

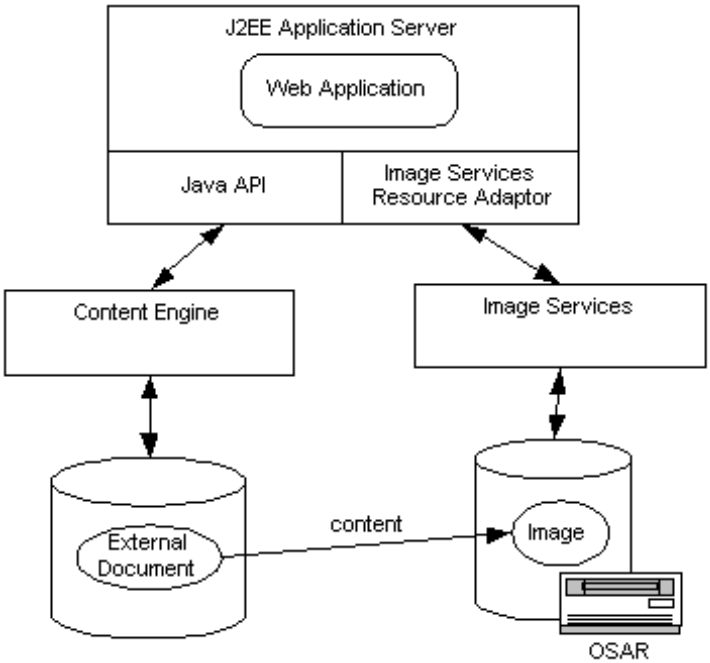
Image Services Integration

There are typically two reasons for using Image Services:

1. Application requirements to integrate with an existing Image Services repository or application
2. Very high volume image acquisition and storage requirements

These requirements can be met by using the Image Services JCA Resource Adaptor (ISRA). The resource adaptor provides a Java API that allows custom applications to query for, update, and retrieve images.

There are two models for leveraging Image Services documents in your applications. The first method involves using the ISRA Java API to dynamically query for and retrieve Image Services documents for use in your custom application. The second model involves creating external documents in an object store which point to an Image Services document. You may choose to use a combination of these models depending on your application requirements. The following diagram illustrates using external documents to point to Images Services content.



Connectivity

FileNet provides a variety of tools for integrating enterprise applications and information systems. In addition to providing a complete set of programmatic interfaces that can be used for performing a variety of integration tasks, several components specifically target typical integration requirements: Enterprise Application Integration and the Component Integrator.

Enterprise Application Integration

FileNet provides Enterprise Application Integration connectors for integrating process and content with enterprise applications. In addition, FileNet offers an optional EAI server through an OEM agreement for IBM CrossWorlds® InterChange Server, Connectors, and Collaborations.

The connectors provided by FileNet allow for easy integration with enterprise application such as SAP R/3, Siebel, and Clarify as well as technologies such as XML, Web Service, JMS, and MQSeries. The FileNet connectors support the following behavior.

- Object, workflow and queue definitions can be exported from the Content and Process Engines for data mapping and specifying processing logic using the IBM CrossWorlds® graphical design tools.
- From EAI you can launch workflows, execute process operations and create, update, and delete documents, folders, and custom objects.
- You can initiate an EAI message from a workflow step or from a Content Engine event, such as when a new object is created or updated.
- Additional connectors for other EAI vendors can be developed using FileNet APIs.

Component Integrator

FileNet provides an extensible integration capability for calling any component from a workflow step. For example, from a step you can make several calls to a Java class that updates information in a corporate customer database. This

integration model makes it easy to create new, or reuse existing, components that a business analyst can then use in the graphical process design tool.

The extensible model makes it possible to create connectors to a variety of technologies. FileNet provides a Java and JMS adaptor out of the box. Customers and partners can create their own adaptors to interact with other technologies.

Enterprise Platform

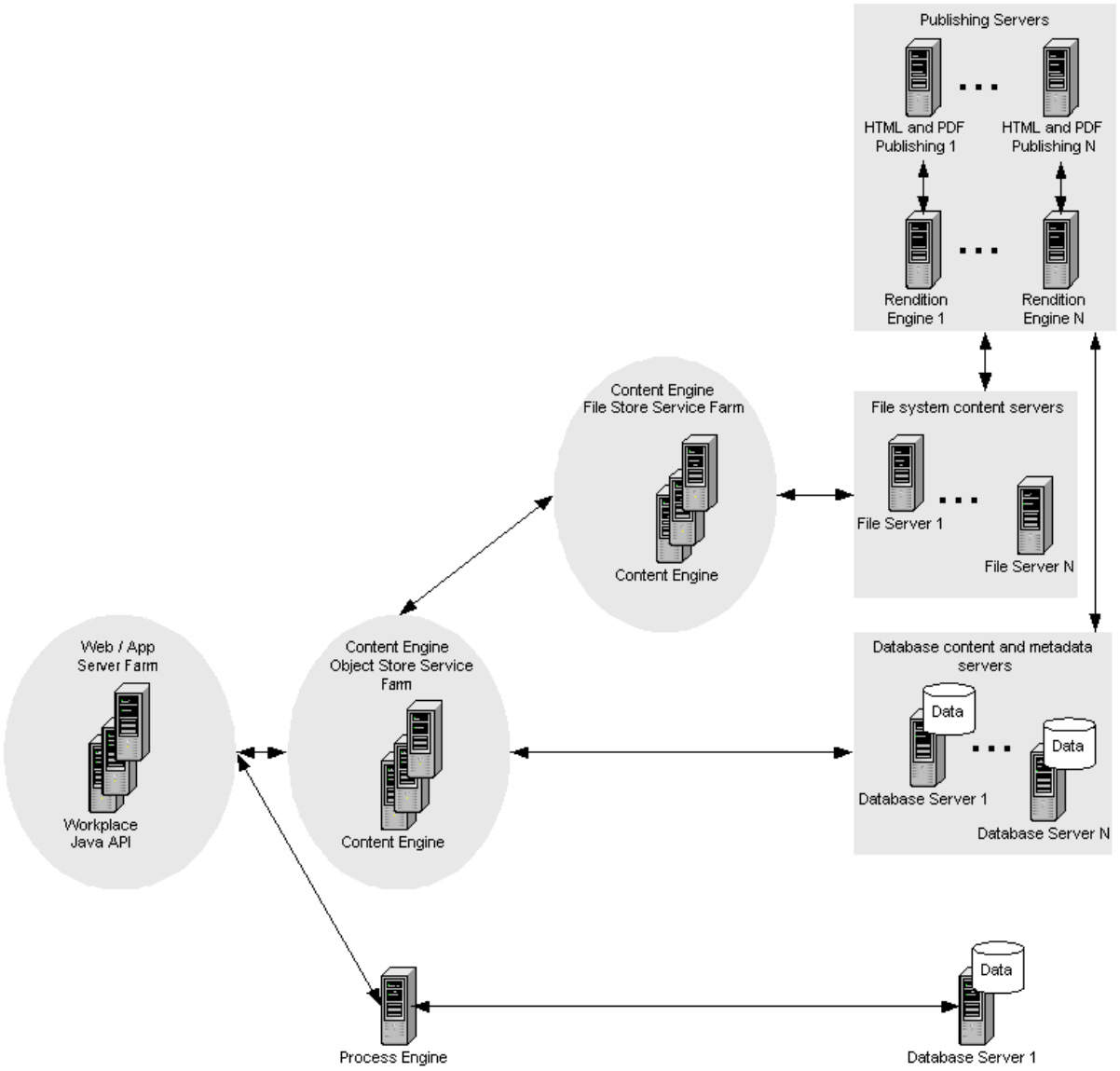
In addition to the features described above, FileNet P8 components provide the enterprise-level capabilities that are required for solving critical business requirements. This section enumerates these product characteristics.

Scalable

The FileNet P8 components support enterprise-level scalability with a multi-tier, distributed architecture.

- Web and application servers can be farmed to support large numbers of users (horizontal scaling).
- Multiple instances of the application server can be run on a single machine (vertical scaling, sometimes referred to as application server clusters).
- Database software can be remotely configured to run on a separate machine so that CPU cycles can be dedicated to database transactions.
- Services that access a content repository can be distributed across any number of machines to handle heavy user access.
- Multiple content repositories can be distributed across databases and machines, allowing the same system to service multiple applications.
- Web sites can be easily deployed to multiple targets for handling large numbers of users.
- Multiple Rendition Engines can be configured to support large numbers of format translations.

The following diagram shows how an application that has very heavy content and format translation requirements could be scaled.



Secure

The FileNet P8 components provides a secure environment for managing content and processes.

Authentication

Users must provide a username and password prior to gaining access to resources. Identity management is not provided by the Content or Process Engines - allowing customers to use directories already present in the enterprise and minimize administrative costs. By default, users and groups are managed in Windows® Active Directory, though they can be managed in a variety of other LDAP-compliant directories and synchronized with Active Directory. In the near future, additional LDAP directories will be supported without requiring synchronization with Active Directory.

Authorization

FileNet provides fine-level access control for all resources. For example, content is secured by assigning users and/or groups with access control levels for viewing content, updating content, updating metadata, updating access rights, and publishing. Default access rights can be defined for each class of object, and security policies can be used to make it easy to pre-define access rights across many documents.

The FileNet P8 applications provide user interfaces for setting access rights that can be reused in custom application. In addition, the Java APIs can be used to set access rights programmatically. Entry Templates can be used to pre-define access rights for all objects that are added to the repository using that template, making it easy for users to add content and ensuring that content is secured correctly.

Security and the web

FileNet supports using the SSL (Secure Sockets Layer) protocol that provides communications privacy over the internet via encryption. In addition, FileNet certifies that components run correctly under a variety of firewall configurations.

Open and Extensible

To promote an open and extensible environment, the FileNet P8 architecture is built on standards such as J2EE™, LDAP, and XML. In addition, a full set of APIs are provided for developing custom applications.

Highly Available

The FileNet P8 family of products provides robust software services, a critical requirement for highly available systems. Software robustness, however, is not sufficient when systems may fail due to both hardware and software problems. FileNet recommends using commercial high-availability solutions that address the myriad of failures that can occur in a complex networked environment. FileNet P8 components leverage several technologies to enable fail over: farming at the web server layer and clustering technologies for backend services and databases.

Web Server Farms

Web server farms provided through hardware or software load-balancing technology provide high availability at the web server tier. The web-based components have been certified to operate within web and application server farms such as BEA WebLogic® clusters and IBM WebSphere® clones. These types of farms provide for server redundancy with the added value of scalability. Application server farms can be combined with hardware based-load balancing solutions such as Cisco routers or software-based solutions such as Microsoft® Network Load-balancer (NLB).

A load-balanced Web server farm provides both better availability and better scalability than a single Web server. When a Web server fails, the load balancer automatically detects the failure and redirects user requests to another server in the farm, thereby keeping the site available. Administrators can increase web site performance and capacity by adding servers to the farm.

Server Clusters

For a complete highly-available solution, web servers and all supporting servers need to be configured for high availability. In a multi-tier architecture, this includes application servers implementing business logic and any servers in the data tier (e.g. databases). These servers are typically data-driven, with large amounts of data, and a constant stream of new or modified data. Using a server farm approach with data replication is not as appealing for these tiers because of the difficulty

in maintaining data synchronization in the face of frequent change. Instead, server clustering products are used which are based on the concept of shared data storage instead of a separate storage device per server. In this case two or more servers share a high availability disk array for data storage. The array incorporates redundant copies of the data but appears as a single shared drive to the servers, thereby avoiding the need for data replication between servers. If one of the servers fails, the other server picks up the workload of the failed server. When the failed server is repaired and ready to run again, the workload is shifted back to the original server.

FileNet Content and Process Engines have been certified with both VERITAS Cluster Server™ and Microsoft® Cluster Server products. Under the Microsoft® Cluster Server, FileNet services such as the Pooled Process Manager and the File Store Service can be monitored. Any failure of the services or databases will result in a switch to a different machine within the cluster.

Global Deployment

The FileNet P8 components were built and certified to run on non-English platforms across the world. In addition, FileNet is committed to providing localized versions of end-user applications.

XML-Enabled

The FileNet P8 family of products support and leverage XML in many ways across the product, including:

XML content management

- XML content is treated like any other content and therefore can be secured, versioned, have a lifecycle, participate in workflows, generate events, etc.
- XML content can be automatically validated and classified.
- XML tags can indexed and full-text searched.

XML as a data format

- Many FileNet structures are represented in XML, including workflow definitions, entry templates, search template, publish templates, publishing assemblies, import/export format, and site/user preferences.

XML for data exchange

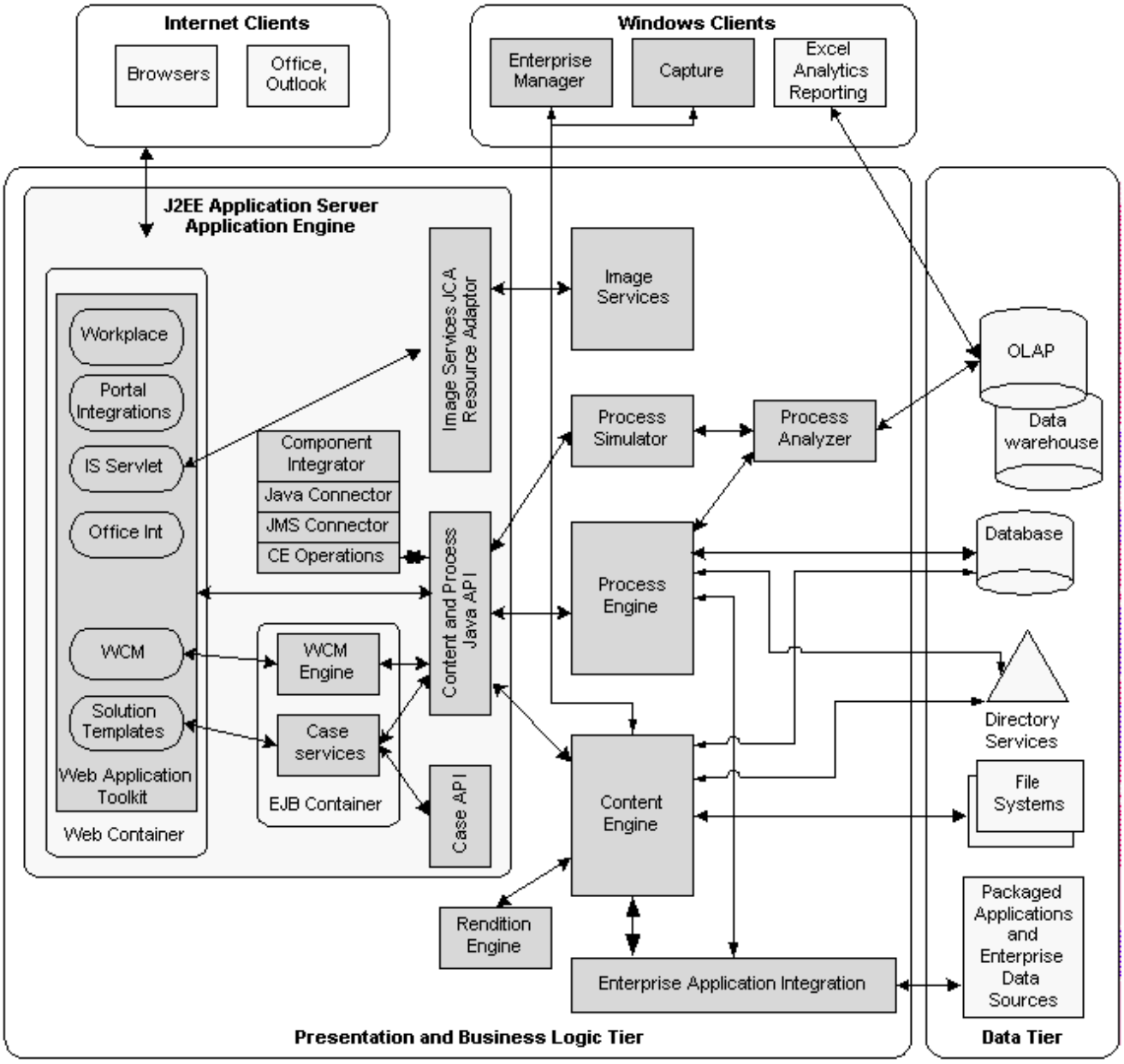
- XML is used to import and export objects and metadata definitions.
- Programmatic interfaces return XML than can be used to integrate with enterprise applications.

XML for application development

- The FileNet P8 Java APIs return XML, for example the contents of a folder can be returned as an XML document.
- XSL transforms are applied to XML to render user interfaces.

Appendix A – Architecture Diagram

The following diagram provides an architectural overview of the FileNet P8 components.



APPENDIX C

Section 508 Compliance

Section 508 Compliance
FileNet Corporation

Overview

FileNet Corporation is dedicated to addressing accessibility requirements in compliance with Section 508 of the Rehabilitation Act of 1973, as amended. As evidence of this commitment, FileNet Corporation initiated a corporate-wide accessibility program to ensure that all points of interaction with FileNet Corporation and our products are addressed. This program was launched during the first quarter of 2001, immediately following the publication of the U.S. Access Board's Electronic and Information Technology Accessibility Standards on December 21, 2000. With strong executive sponsorship across the organization, this initiative is designed to address electronic and information technology accessibility for people with disabilities.

Accessibility Expertise

FileNet has selected Ciber's Accessibility Center of Excellence (ACE) as our accessibility partner. We believe that this partnership will ensure a comprehensive and accurate evaluation of our products and services.

Ciber's Accessibility Center of Excellence (ACE) was selected based on both their extensive knowledge of Section 508 and their vast global experience in delivering accessibility education and professional consulting services. The ACE team offers more than a decade of experience combining law, policy, and technology to serve people with disabilities and has provided accessibility services to federal/state agencies, universities, and the private sector. This comprehensive approach to addressing accessibility for persons with disabilities includes Section 508, the Americans with Disabilities Act, the international work of the World Wide Web Consortium Web Accessibility Initiative, as well as human factor usability design and testing methodology. Members of the ACE team currently serve on multiple national and international task forces and committees on disabilities and technology. We are confident that this partnership between FileNet and ACE will yield the best overall results for our customers.

Product Evaluation and Design Standards

FileNet is addressing accessibility requirements through comprehensive product evaluation and design changes. We are currently in the process of evaluating our products for compliance with Section 508 standards. Product evaluations and subsequent development efforts are phased in consideration of the size of the user community as well as the release cycle of a particular product. Initial product reviews have confirmed that the majority of products in FileNet's product lines already offer certain accessibility features and functionality.

FileNet is pleased to provide additional information regarding our comprehensive product design standards and product compliance. Please contact your local account team for further information.

Appendix A – Program Implementation

Task	Description	Current Status
I	Establish a cross-functional accessibility team including representation from Engineering, Product Management, Customer Service and Support and Industry and Corporate Marketing.	Complete
II	Interview, Obtain Proposals, Check References and Select Industry Leading Accessibility and Section 508 specialists to partner with for the FileNet Section 508 Compliance Initiative.	Complete
III	Conduct a comprehensive Section 508 Assessment for all FileNet's products.	Complete
IV	Obtain education for the cross-functional accessibility team on Section 508 technical accessibility standards, the relationship between persons with disabilities and technology, and the role of assistive technology from the selected accessibility partner.	Complete
V	Review FileNet core products with our accessibility partner and develop a detailed implementation plan for Section 508 compliance within FileNet's products and services.	Complete
VI	Work closely with our accessibility partner to ensure Section 508 compliance based on Electronic and Information Technology Accessibility Standards, published by the U.S. Access Board on December 21, 2000 at 36 CFR Part 1194. This compliance will be achieved by incorporating Section 508 Subpart B – Technical Standards, as applicable, in all of our design, development, and testing activities. In particular, FileNet is addressing Section 508 product compliance in existing and new releases during product: 1) design 2) design review 3) prototyping 4) construction 5) testing 6) quality assurance 7) training of support staff	Ongoing
VII	Work closely with our accessibility partner to train FileNet quality assurance and engineering staff in industry leading human factor testing techniques and the use of industry leading assistive technology for testing.	Complete
VIII	Enhance testing environment enabling FileNet engineers and quality assurance experts to test current and future releases of products in conjunction with industry leading assistive technologies, human factors testing techniques, and automated Section 508 compliance assessment and remediation tools.	Complete
IX	Work closely with our accessibility partner to assess FileNet's information, documentation and support for compliance with Subpart D of the Section 508 Final Standards.	Complete

Appendix B – Product Compliance Status

Product Line	Component	Interface	Compliance Status	Note
Business Process Manager, Content Manager and Web Content Manager	Application Engine Content Engine Process Engine	Installers	NA	Installers have not been tested for compliance as they are administration tools
		Enterprise Manager	NA	Installers have not been tested for compliance as they are administration tools
		PE Admin Tools	NA	Installers have not been tested for compliance as they are administration tools
		VW Server Tools	NA	Installers have not been tested for compliance as they are administration tools
		Task Manager	NA	Installers have not been tested for compliance as they are administration tools
	WorkPlace	HTML Interface	Yes	This product is the primary interface to end users.
		Java Step Processor (sample)	NA	Tool is visual in nature. Compliance would impose undue burden.
		Search Designer	NA	Tool is visual in nature. Compliance would impose undue burden.
		Publishing Designer	NA	Publishing functionality is a preview feature in the 2.0 release. Tested for keyboard support only as screen readers do not function with Java Applet technology.
		Process Config. Console	NA	Tool is visual in nature. Compliance would impose undue burden.
		Process Administrator	NA	Tool is visual in nature. Compliance would impose undue burden.
		Process Designer	NA	Tool is visual in nature. Compliance would impose undue burden.
		Tracker	NA	Tool is visual in nature. Compliance would impose undue burden.
		Image Viewer	NA	Tool is visual in nature. Compliance would impose undue burden. Tested for keyboard support only as screen readers do not function with Java Applet technology.
	Application Integration	Installer	NA	Installers have not been tested for compliance as they are administration tools
		UI	NA	Compliance is dependent upon the application being used (MS Word, MS Excel, etc.) Customer can use Workplace to perform functions.
	WebDAV	Third Party Tools	NA	Compliance is dependent upon the application being used (MS Word, MS Excel, etc.)

	Documentation	Installer	NA	Installers have not been tested for compliance as they are administration tools
		On-Line Help	Yes	
	Process Simulator	Installer	NA	Installers have not been tested for compliance as they are administration tools
		Designer	NA	Tool is visual in nature. Compliance would impose undue burden. Tested for keyboard support only as screen readers do not function with Java Applet technology
		Console	Yes	Tested for keyboard support only as screen readers do not function with Java Applet technology.
		Animator	NA	Tool is visual in nature. Compliance would impose undue burden. Tested for keyboard support only as screen readers do not function with Java Applet technology
	Process Analyzer	Installer	NA	Installers have not been tested for compliance as they are administration tools
		Client (Microsoft Excel)	NA	Compliance is dependent upon the application being used (MS Word, MS Excel, etc.)
Image Manager and Functional Expansions	Web Services Open Client		Yes	Open Client is Section 508 Compliant with the exception of the IDM Viewer and the Java applets. The screen reader FileNET uses cannot read Java applets (this includes the eProcess Configuration console, Designer, Administration Tool and the Java Viewer).
	eProcess Services		Yes	eProcess is Section 508 Compliant with the same exception as noted above if accessed via Open Client. eProcess is not compliant if accessed via Web WorkFlo. The Designer is considered exempt because of its 'visual' nature.
	eForms		Under evaluation	
	Capture Desktop		Yes	
	Capture Professional		Yes	
	Web Publisher		Yes	
	Content Services		NA	
	WebDAV		Yes	Section 508 Compliance for WebDAV is dependant upon the application being used (e.g. MS Word, Adobe Acrobat and Macromedia Dreamweaver).

	Web Services HTML Sample Pages and ActiveX Client		Under evaluation	
	WorkFlo Services Administrator, Configuration Console and Linker		NA	Limited UI on the server are administration tools.
	Print		NA	Considered an admin tool
	WorkFlo Services Designer, Tracker, Java Step Processor and Java Launch Step Processor		NA	Designer is considered exempt because of its visual nature. Java applets are not compliant because the screen reader we use cannot read Java applets.
	Portal Integration for SharePoint		NA	Since it's a toolkit and SharePoint Portal Server from Microsoft is not 508 Compliant
	Image Services		NA	Image Services software is considered exempt because all user interaction is done via service personnel for maintenance, repair or occasional monitoring of equipment
	Report Manager		Under evaluation	
	IDM Desktop		Under evaluation	(See Open Client for a 508 compliant client)
	Application Connectors for SAP		Under evaluation	
	Application Connectors for Siebel		Under evaluation	
	Image Services Toolkit		Under evaluation	
	Content Services Admin Tools and Rendition Services		Under evaluation	
	Case Management for Imager Manager		Under Evaluation	
Web Content Management	WCM 5.x		Under evaluation	

Initial evaluations have been done for the products in this table that are marked 'under evaluation' and indicate that each product contains certain accessibility features today. Future development efforts will focus on expanding the breadth of compliance to meet Section 508 standards.

A phased approach to delivering additional accessibility functionality has been taken to ensure that FileNet's user community can take advantage of incremental software product features quickly. As such, initial product development efforts will focus on addressing components of Section 508, Subpart B, C and D as outlined in the following page.

Subpart B – Technical Standards

1194.21 Software applications and operating systems
Examples of this include, but are not limited to, keyboard accessibility, color/contrast usage, graphics, electronic forms, and tables.

1194.22 Web-based Intranet and Internet information and applications
Examples of this include, but are not limited to, alt attributes, color/contrast usage, data tables, and electronic forms.

The following Subpart B technical standards are not applicable to the FileNet products:

- 1194.23 Telecommunications Products,
- 1194.24 Video and Multimedia Products,
- 1194.25 Self-Contained, Closed Products, and
- 1194.26 Desktop and Portable Computers.

Subpart C - Functional Performance Criteria
Design efforts focus on addressing all components of 1194.31.

Subpart D – Information, Documentation and Support
Design efforts focus on addressing all components of 1194.41. FileNet is currently evaluating solutions for delivering accessible support services such as TTY and documentation in accessible formats.

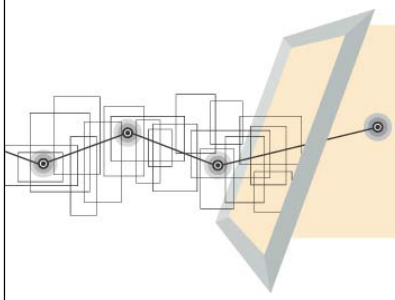
It is important to remember that FileNet products represent part of an overall technology solution. Each component must not only provide accessible features independently, but must be integrated with other layers of technology to provide optimal usability. FileNet's compliance efforts apply to products built, supported and sold by FileNet.

Testing tools

FileNet recognizes the significant benefit extended through assistive technologies. As such, we have enhanced our testing environment, enabling FileNet engineers and quality assurance experts to test current and future releases of products in conjunction with industry leading assistive technologies. Coding guidelines and test plans now include Section 508 requirements as part of the standard development and quality assurance processes. Additional testing will incorporate human factor testing techniques, and automated Section 508 compliance assessment and remediation tools.

APPENDIX D

FileNet Web Content Manager



FileNet Web Content Manager

A Technical White Paper
June 2003

Executive Summary

Information. It's the lifeblood of business. For most businesses, the Web today represents the primary channel for communicating information and conducting business electronically with customers, partners, and employees across the enterprise. Web content is continually changing, yet the Website must be always accurate, timely, engaging, easy to navigate, secure, consistent, and compliant with corporate policies and external regulations. At the same time, managing the creation, approval, and publishing of this content must be cost-effective and easy enough that contributors, reviewers, and administrators throughout the enterprise can perform those functions as routine office tasks.

This is the challenge of Web content management in business today. Virtually every content type, from HTML text and graphics to PowerPoint and Word documents, scanned paper documents, live online data, and streaming multimedia, is represented on company Websites. Thus a repository for Web content must be able to manage the full spectrum of enterprise content and deliver the same set of basic content management services, including indexing, storage, search, access control, revision control, and review and approval tracking, found in Enterprise Content Management (ECM) systems. But Web content management must also deal with the specific processes involved in creating and maintaining Websites, allowing the various pieces of content to be interlinked, assembled dynamically on the page, and reused across the site.

FileNet Web Content Manager is based on the FileNet P8 architecture, which provides a unified enterprise-scale platform for managing all forms of content, automating business processes, and integrating enterprise applications with high performance and flexibility. FileNet Web Content Manager provides an out-of-the-box application and wizard-based tools exposing the capabilities of the underlying FileNet P8 Content Engine, and Process Engine. It can be easily extended to include the full suite of FileNet P8 capabilities, including business process management, production image services, and enterprise application integration. Web Content Manager thus provides both the broad ECM foundation and the specific application features needed to build and maintain agile, dynamic Web sites. It combines comprehensive content management services for all forms of enterprise content with out-of-the-box review and approval workflows, and other features specifically designed to simplify the deployment and maintenance of continually changing Websites.

Web Content Manager takes unique advantage of FileNet P8's event-driven architecture and Active Content capabilities to drive the entire Web content lifecycle, from creation to deployment and archival retention, based on automated policies and rules. With Active Content, businesses can respond immediately to the business and transaction events affecting content publishing and maintenance, decreasing time-to-Web while increasing the agility of business operations.

Table of Contents

Elements of a WCM Solution

Web content management must be able to handle the full spectrum of enterprise content, and at the same time deal with the special characteristics of the Web. A single Web page is typically composed of content fragments of different types, created by different contributors using different authoring applications, and reviewed and approved using different procedures. To go from creation to deployment on the Website, all of these content pieces must be converted to Web-viewable formats, made searchable with metadata, assembled for presentation in a visually pleasing, consistent way, and linked with the overall navigation structure of the site. Now multiply this by the thousands of pages that make up the site.

At one time, doing all this was the job of a Webmaster, who imposed order and consistency through heroic manual effort. The result, however, was a Website production bottleneck that proved unable to cope with daily updates to Web content. A fundamental benefit of Web content management software is eliminating the Webmaster bottleneck by allowing users throughout the enterprise to contribute, revise, and approve content for Web deployment without the intervention of a Webmaster, while assuring that the necessary formats, links, metadata, and visual presentation are all generated automatically, consistently, and in a safe, transactional manner.

Accomplishing all that imposes a tough set of functional requirements on a Web content management (WCM) solution:

Content Contribution/Acquisition

WCM must allow users throughout the organization to contribute or "acquire" Web content of any type quickly and easily using familiar authoring and "content capture" applications, without special training or knowledge of Web technology. This means the WCM software must provide:

- Ease of use for content contributors, using wizards and similar user-friendly technology
- Direct submission from common authoring applications such as Microsoft Office
- Easy import of existing content from filesystems and existing ECM repositories
- Automatic conversion from common authoring formats to Web rendition formats such as HTML or PDF
- Automatic application of consistent presentation via predefined page templates, transparent to the content contributor
- Powerful search for existing content in the WCM repository
- Automatic generation of all internal links, transparent to the contributor

Content Management

WCM must streamline and automate procedures for content review, revision, and approval, while ensuring access to content and associated metadata is restricted to authorized users. It also must provide the administrative tools required to customize those

procedures, as well as configure page templates and overall Website organization. Specifically, the WCM solution must provide:

- Support for all content types, including HTML, XML, graphics, rich media, revisable documents, scanned image documents, reports, and live data
- Comprehensive content management library services, including automatic version management, check-in/check-out locking, and fine-grained access control
- Management of Web content at the level of sub-page components, rather than at the page level
- Workflows to automate and track common review-and-approval processes, test-and-deploy processes, and other processes commonly required to build and maintain Websites
- User access to workflow and other content management tasks through a Web portal interface

Site Management

WCM must provide powerful administrative tools to ensure site content is accurate, consistent, and engaging, without burdening content contributors. Functions include:

- Workflow definitions
- Definition of shared components
- Definition of page templates, including import from Dreamweaver and other popular page builder tools
- Site creation
- Organization of overall site structure

Deployment

WCM must allow for content to be created once, but repurposed across multiple Websites. It also must manage the periodic integration testing and deployment of Web content from the content development environment to the intranet, extranet or public Website. To do this, it must provide:

- Assembly and preview of Web pages from current versions of all components, including dynamic content called by Java Server Pages (JSP) or Active Server Pages (ASP).
- Multiple templates/formats to be applied to a single piece of content
- Secure packaging and transfer of all deployed components from the development environment to a test or production Website, properly generating all internal links
- Support for site-wide integration test and QA for each deployed release of the site, with transactional rollback

System Architecture

WCM must be built on a scalable, reliable, high-performance architecture, supporting content contributors, reviewers, and approvers throughout the enterprise. It should leverage other key elements of enterprise IT infrastructure, including ECM services,

business process management, and connectivity middleware to external applications, data sources, and content repositories. Ideally, a WCM solution should support:

- A distributed, multi-tier platform architecture
- Scalability to hundreds of concurrent business users
- Scalability to millions of content items in the repository
- Ability to run on leading application servers, portal servers, and DBMS platforms
- Native support for standards such as J2EE, .NET, XML and SOAP
- Integration with enterprise content management infrastructure
- Integration with enterprise BPM infrastructure
- Integration with enterprise applications via standard middleware

FileNet Web Content Manager

WCM Overview

WCM in the FileNet P8 Family

The FileNet P8 family of products is a suite of applications, component services, and development tools that address enterprise content, process, and connectivity requirements, forming a comprehensive enterprise infrastructure for both Enterprise Content Management and Business Process Management. FileNet Web Content Manager (WCM) is a packaged set of FileNet P8 applications designed specifically for Website design and maintenance (Figure 1). Other packaged FileNet P8 configurations include FileNet Content Manager, managing all types of structured and unstructured content, FileNet Business Process Manager (BPM), supporting end-to-end process management and enterprise application integration, and FileNet Image Manager (IM), supporting high-volume production document imaging.

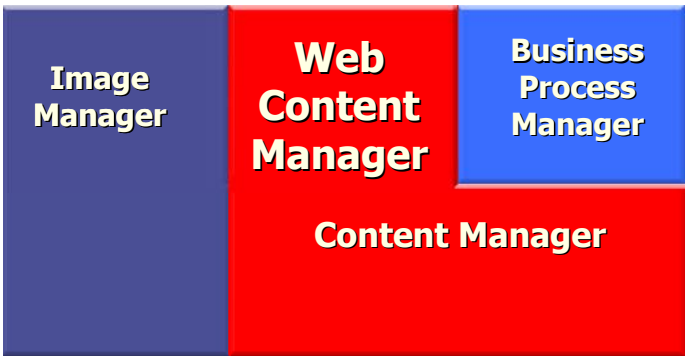


Figure 1. FileNet WCM includes all of FileNet CM

WCM includes and shares the same underlying architecture as the FileNet Content Manager (CM). WCM also incorporates the same Process Engine used by FileNet BPM to automate and track business processes. Many out-of-the-box, Web-specific processes are included. However, WCM can be easily extended to include full business process management capabilities by adding BPM components, and can be integrated with

production imaging through the FileNet Image Services Resource Adapter (ISRA). The architecture and packaging of FileNet P8 allows for customers to start at any configuration entry point with a base suite offering and expand the solution into different directions by adding on components and capabilities that meet their specific requirements.

All FileNet P8 applications, including WCM, are supported by a full-function application called Workplace that allows users to contribute and manage content and participate in business processes. In addition, FileNet provides an alternative WCM Application specifically designed for Web content contributors, approvers, and site administrators.

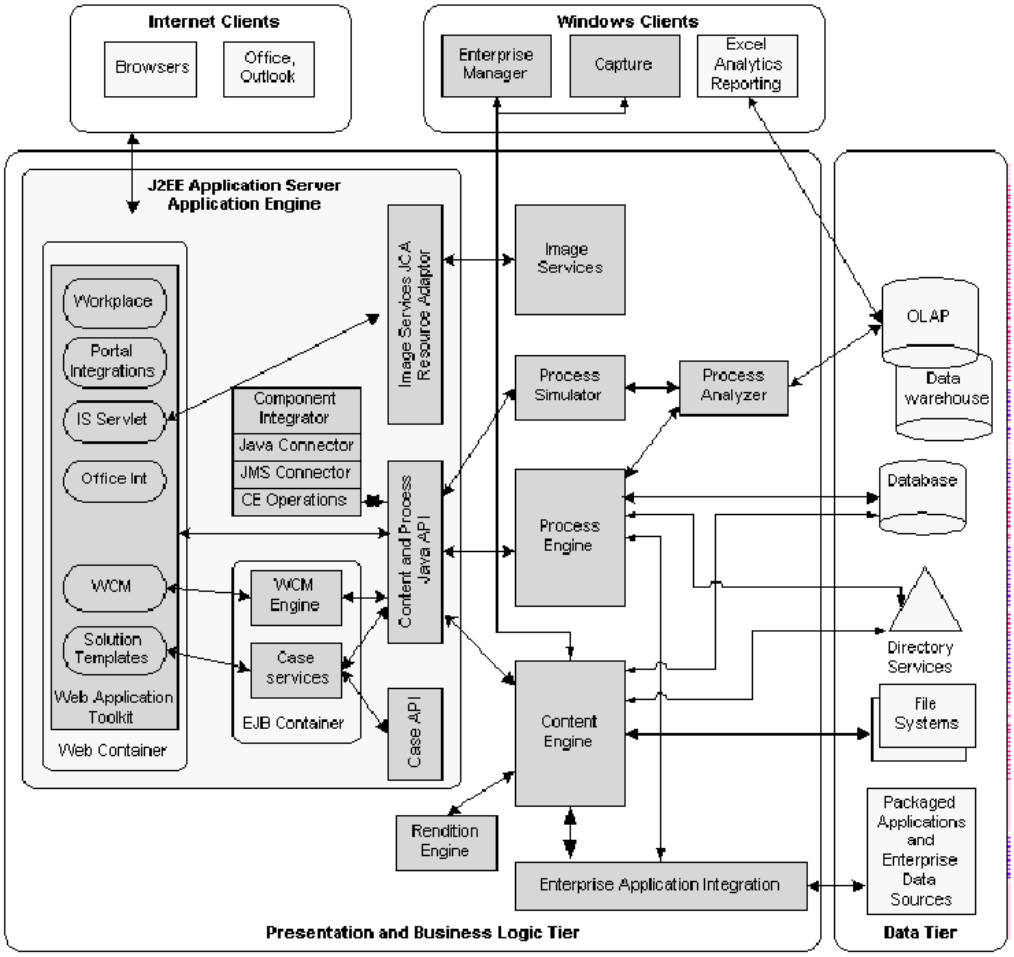


Figure 2. FileNet P8 technical architecture

WCM Technical Architecture

FileNet WCM is based on the Java 2 Enterprise Edition (J2EE) architecture, which provides a vendor-independent platform for enterprise-scalable, highly available applications supporting thin clients and standards-based connectivity. WCM (Figure 3) supports both BEA WebLogic and IBM Websphere application servers. It includes a

choice of JSP-based Web client applications (WCM or Workplace) integrated with the WCM Engine.

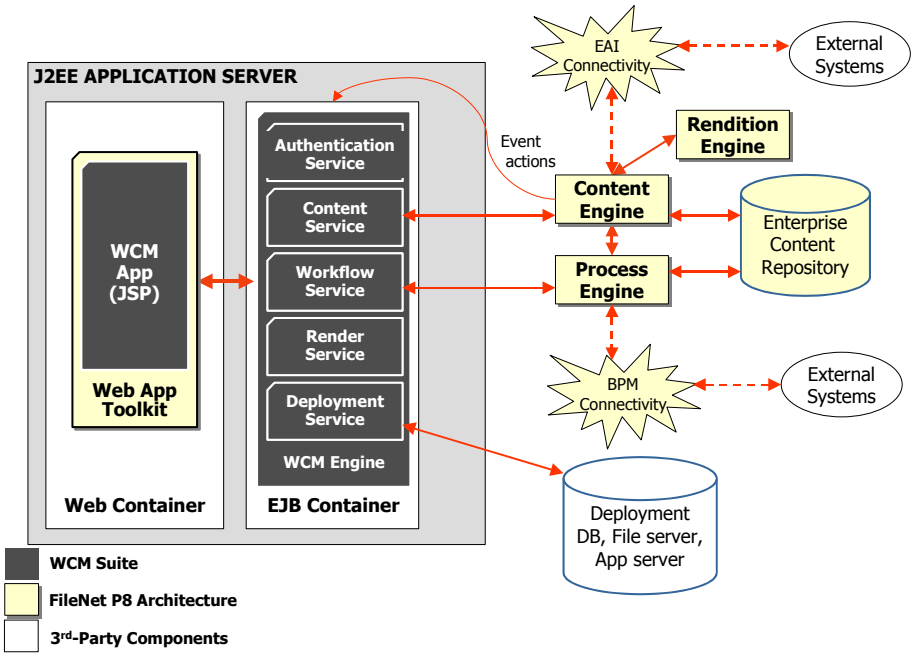


Figure 3. WCM Technical Architecture

WCM Engine

The WCM Engine is a set of five core services implemented as Enterprise Java Beans (EJBs):

- Authentication Service – Leverages FileNet P8 unified security model
- Content Service – Manages page structure and access to WCM content. Supports complete Content Manager functionality provided by the Content Engine, including version management, check-in/check-out, access control, metadata, and format conversion
- Workflow Service – Provides WCM-specific functions via the FileNet P8 Process Engine
- Render Service – Assembles page or components from content and templates for preview and deployment, and maintains component relationships
- Deployment Service – Deploys content to production file system, DB, or application server, saving rendered output in Content Engine as complete WCM pages

In addition to interacting with the FileNet Content Engine and Process Engine via their Java APIs, the WCM Engine can respond to Content Engine or Process Engine events using FileNet P8's Active Content publish-subscribe integration model. These events, such as content added, content modified, workflow task completed, or workflow deadline expired, can be configured to trigger WCM processes automatically, and WCM events such as content lifecycle changes can trigger other Content Engine or Process Engine actions. In addition, both Content Engine and Process Engine support connectors to

popular EAI middleware (IBM WebSphere InterChange Server, Vitria BusinessWare, and others), linking WCM to events and actions in enterprise applications such as Siebel or SAP.

Content Engine

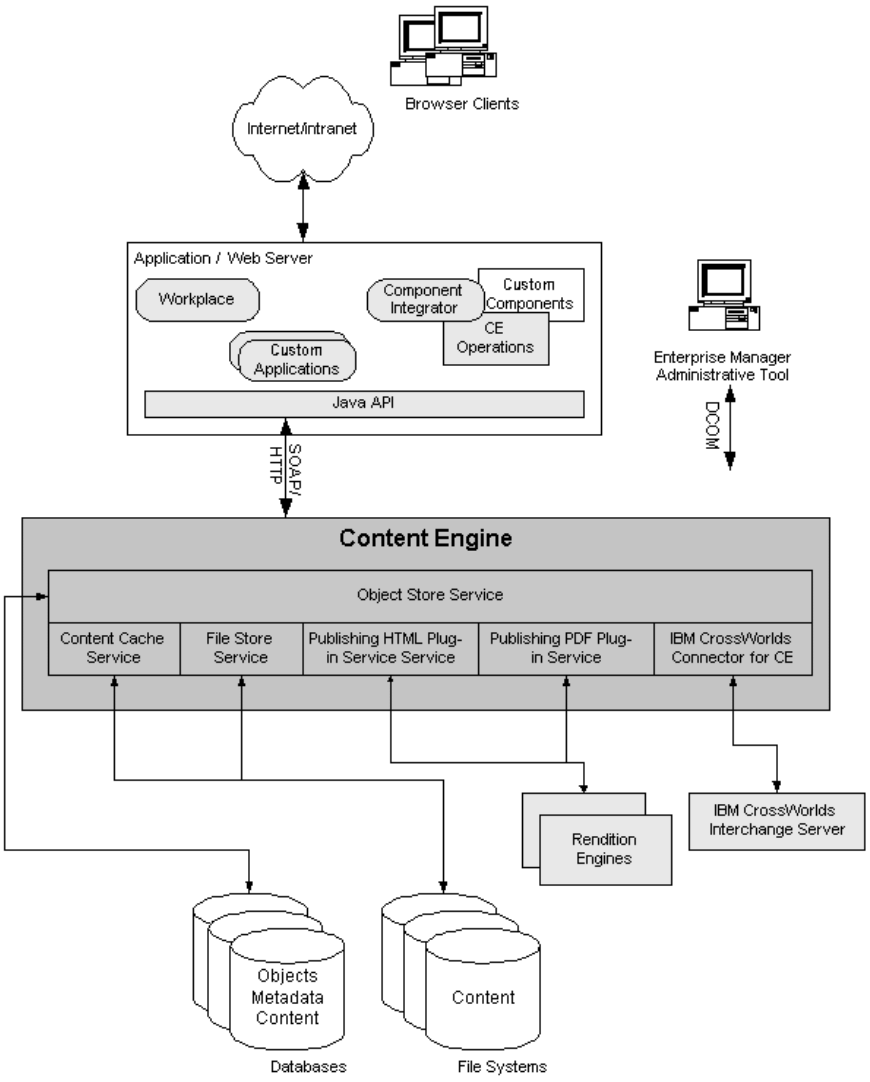


Figure 4. Content Engine Architecture

Figure 4 shows the services provided by the FileNet P8 Content Engine:

Object Store Service - Manages one or more object stores, handling database transactions, managing metadata and database-stored content for objects such as WCM pages, templates, searches, and workflow definitions. The Object Store Service allows content to be stored in a file system or in a database and it also provides support for full-text indexing, property search, content-based search, server events, automatic content classification and document lifecycles.

File Store Service – The File Store Service is a subclass of the Object Store and the physical location where content is stored in the file system. The service manages one or more file stores for storing content. It also manages the interaction with the full text search engine by storing and managing the access to the index files.

Content Cache Service - If enabled, allows the system to retrieve content from remote file stores and cache it locally for later interactions.

Publishing PDF Plug-in Service - Manages requests to render documents into Adobe Acrobat PDF format. Submits format translation requests to Rendition Engines.

Publishing HTML Plug-in Service - Manages requests to render documents into HTML format. Submits format translation requests to Rendition Engines.

EAI Service - Enables communications between Content Engine servers and enterprise applications through a connector with IBM Websphere Business Integration InterChange Server or other Enterprise Application Integration solutions.

Standards-based Communications – SOAP/XML

Web Application Toolkit

The Web Application Toolkit provides a framework for developing Web applications that run in a J2EE environment. The toolkit is used by several FileNet P8 applications, including Workplace, Solution Templates, and the Web Content Manager.

The diagram below provides a logical view of the Web Application Toolkit architecture as used by WCM.

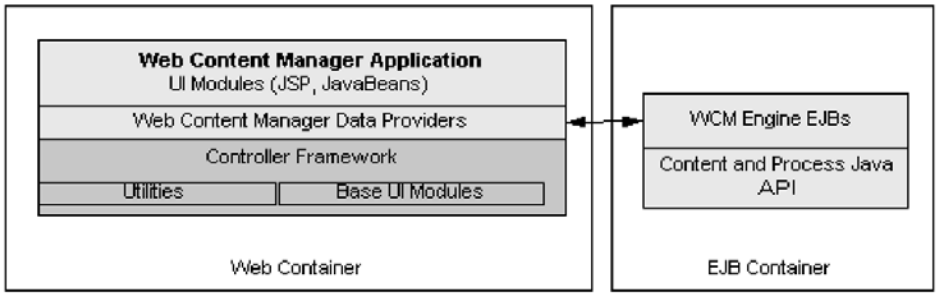


Figure 5. Web Application Toolkit in WCM

Controller Framework provides base classes that support the Model-View-Controller (MVC) architecture that the Web Application Toolkit is built upon. MVC is a common design pattern that decouples data access, business logic and presentation – resulting in applications that are easier to develop and update over time.

Utilities handle functions such as localization support for building global Websites and a model for storing user preferences and site configuration parameters.

Base UI Modules provide base behavior and data structures for user interface components such as wizards, menus and toolbars.

Data Providers provide data for the application by encapsulating server APIs such as FileNet's Java APIs or other third party services.

The Web Content Manager Application leverages the Web Application Toolkit's Controller Framework, Utilities, and Base UI Modules. Additional functionality provided by Workplace includes user interface components – including JSP pages that specify the page layout, JavaBeans™ that render user interfaces, XSL documents that are used to control how XML returned from the Java API is rendered in the user interface, and Cascading Style Sheets (CSS) that define fonts, colors, etc.

Enterprise Connectivity

Virtual Content Management Framework

The Content Engine supports the creation of objects that reference content stored outside of an object store. For example, you can create an external document that points to content that resides in FileNet P8 Image Services. This allows you to aggregate and manage content stored anywhere on the network. In addition, Workplace supports the registration of external services that are used to retrieve the content. This provides a pluggable mechanism for displaying the content to an end user from the Workplace application.

EAI Connectors

FileNet provides EAI connectors linking FileNet P8 with IBM Websphere InterChange Server, with an open model for using other popular business integration servers such as Vitria Businessware, and SeeBeyond, allowing WCM to participate in automated business processes across the enterprise. The connectors translate Content Engine events into the message formats understood by the integration server, automatically triggering actions in external application systems like Siebel and SAP. Conversely, FileNet P8 processes can subscribe to events generated by those external systems, automatically triggering a WCM process, for example, when an invoice is generated in SAP.

WCM Component Model

FileNet Web Content Manager provides a component-based architecture for creating and managing Web content. All content is created and managed as individual components, promoting a "create once and reuse everywhere" model.

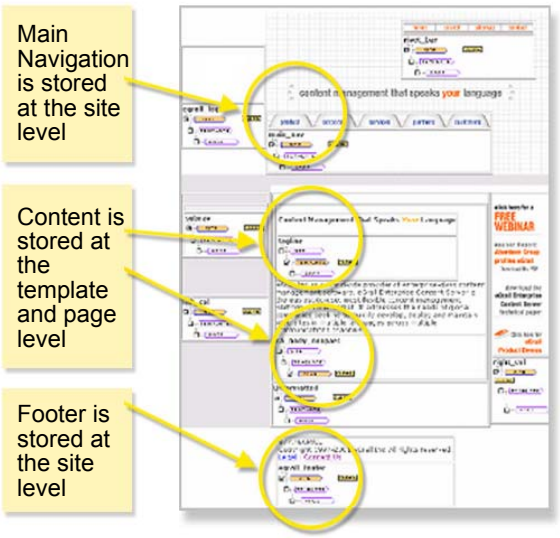


Figure 6. Components can be locked for reuse at site or template level

Components allow the data, format, and structure of Web content to be managed independently. Each component is created and managed separately to maximize reuse and maintain site integrity. The advantages of a component model over traditional file-based Web content management models are:

- It promotes independent and parallel work by Web site designers, content contributors, programmers, graphic artists, and site administrators. Users focus on their respective tasks, without thinking about components provided by others. Components can be developed and applied independently at the site, template, and page level by different classes of users (Figure 6).
- It separates content from site look and feel, enabling visual consistency across the site. It also allows fast and flexible modification of the site's look and feel without affecting content.
- It promotes content reuse through shared references. Pages are typically built using *references* to shared components such as logos, footers, and navigation widgets rather than instances of the component itself. In this way, a graphic, for example, need only be created once and can be reused everywhere. Any changes to the graphic are automatically propagated across the site without any manual updates.
- It guarantees link integrity, while assuring timely updates to changes in dependent pages.

Anatomy of a Web Page

Web pages in WCM are composed of templates, text components, assets (linked graphics and other binary information), composite components, and code. WCM component-level architecture is designed to manage pages by managing their components and the relationships among them.

Components

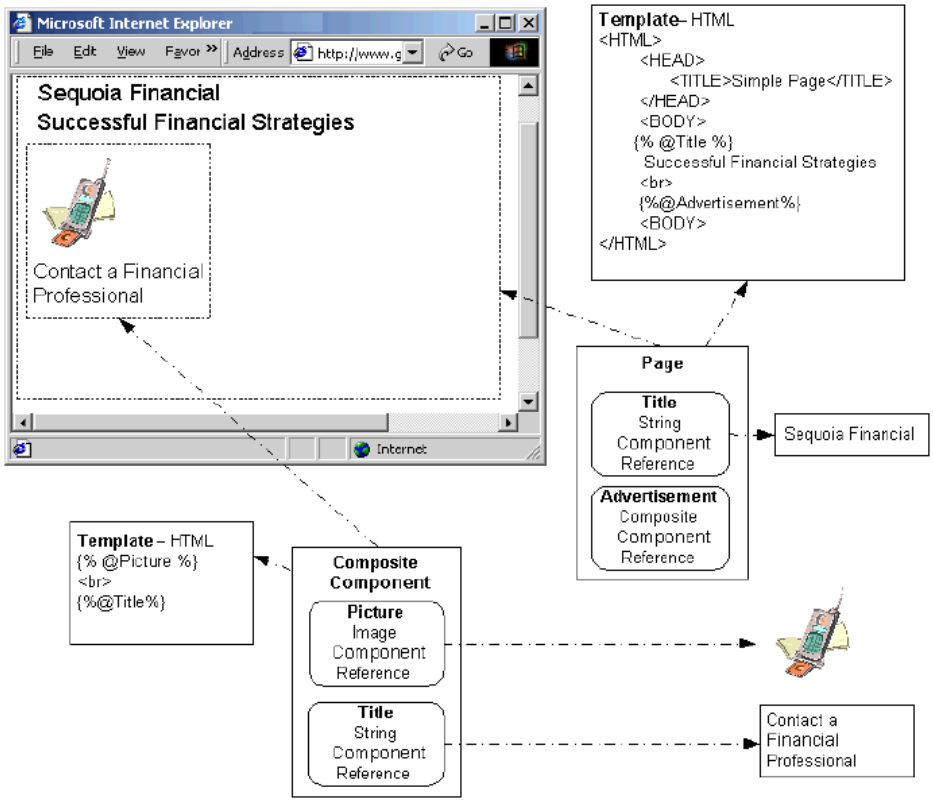


Figure 7. Component structure of a Web page

Figure 7 illustrates how Web pages are built from components. This page contains two components: *Title* and *Advertisement*. The page is associated with a template that defines how the data on the page is formatted. Templates can be HTML, XML, or any other presentation language that can be interpreted by a Web server or Web application server. The *Advertisement* component is actually a *composite component*, a "mini-page" fragment built from other components using its own template. Composite components support consistent page layout and easy reuse of coarse-grained content, such as the Advertisement, across the site.

WCM component types include:

- Content components – text components and assets (binary)
- Structural components – page components, composite components, and template components

Pages and Templates

A **Web page** consists of a page component and WCM Pages. A page component contains the template, content, and structure for the WCM pages. A WCM Page is a specific rendered instance of a page component for a given location and format. Editing acts on the page component; deployment and viewing act on the rendered WCM Page.

WCM Pages are stored in the doc root for a site folder in the FileNet P8 Content Engine. The page location in the site structure and its name determine its URL. For example, relative to the Content Engine root folder, the home page for the Sequoia Financials site would have a URL like */WCM Root/Sequoia Financial Site/doc root/Sequoia Home Page*.

Page components are stored in the WCM Engine. The page component is effectively the root composite component for the page. This component contains the internal representation of a page and references the WCM Page stored in the Content Engine. The page component contains component reference values and a reference to the template component for the page. The template component contains component references and component reference values. The template component points to a WCM template for each format that is active in the current site.

Templates are the presentation component of the page that define how to display structured content. They can be written in any text-based presentation language, including HTML, XML, WML, or SGML. The format determines how the page is rendered. HTML is the most common format, but alternate formats like printer-friendly or WML may be used in addition. When a new piece of content is added in FileNet WCM, it will have WCM Pages created for each active format on the site.

Templates include a Template component and WCM Templates. The **Template component** contains the data structure and component references. **WCM Templates** contain the text or code of the Template for a given format. For example: *SequoiaMainTemplate.html* and *SequoiaMainTemplate.wml* are both WCM templates used in conjunction with the Sequoia main page. The main page has two WCM Pages, one for each format – HTML and WML. WCM Templates are stored as Content Engine documents, and template components are stored in WCM. Template components contain references to all the templates in each format that are stored in the Content Engine.

Component References

Component references are named placeholders for components that are stored with pages and composite components, enabling component reuse and management at the global (site) or template level, rather than hard-coding common text or graphics in each place where they are used. For example, if the company logo component reference definition is locked at the global level, then wherever that logo is used on the site it will be guaranteed to be the same.

Component references are invoked in templates either by WCM tags or by permanent links in the template editor. **WCM tags** look like {% @CompanyTitle %} or {% @sitename:CompanyTitle %}. **Permanent links** are component references that are associated with the template but are not included in any WCM Template and thus are not visible on the page. Permanent links enable data to be deployed to a database without being rendered on the page.

WCM provides a list of pre-defined component reference types including text, images, and more, which can be customized and extended. A component reference value can be locked at the global or the template level, preventing users from changing it. Values can also be restricted to a pre-defined list, or the component can be made invisible in selected WCM preview modes, preventing accidental modification by users.

Text and Assets

Text components contain text for things like headlines, captions, paragraph body, or footnotes. Text components are called global if they are shared between pages. Local text components can only be used by a single component in a page. Text components are stored in WCM in a folder under the site root reserved for storing the site's text components. A text component may optionally be defined to be a document in the Content Engine.

Assets are documents that contain binary content such as images, video or MS Word files. Assets are always stored as documents in Content Engine. They automatically inherit all the document features like versioning, lifecycle, and security. WCM differentiates assets based on their MIME types.

RFCs

Rendering Function Calls (RFC's) are Java or Macro methods that get embedded in a page and executed at render time. They are typically used to provide links to assets, listings of documents, or navigation. If you store an asset in an RFC you are guaranteed referential integrity. The Java methods facilitate complex, structured logic, while the macros enable easy-to-use, no compilation code replacement.

WCM ships with a set of pre-packed RFCs. Here's a sampling:

- builtin.indentedNavigation()- returns an indented site navigation that presents a view of the site's folder tree where all pages are presented as links.
- document.toURL() - returns the relative URL of the WCM page or asset.
- document.toLink() - creates a hyperlink to the page using a relative URL.
- document.toImage() - displays an asset on a page.
- folder.toBreadCrumb() - places a breadcrumb navigation element on a page. Links always point to index pages whenever possible and are bound to the same format as the format of the start page.
- folder.toListing() - generates a listing of all documents or folders within a specified folder, which can be used to include news listings of a given category or as a navigation element.
- getProperty() - renders the value of the property for the specified element.
- image.getSize() - returns the size of an image.

WCM Components and Content Engine

All information entities stored and managed in the FileNet P8 Content Engine are represented as **objects** that are described by their **class**, or object type, their **properties**, and the **methods** associated with their class. The benefit of an object-oriented technology is ease of management through class-instantiation and inheritance. The repository for these objects is a Content Engine object store, which could be implemented using either a filesystem or a database. Every object in an object store is associated with a class. Classes serve as templates for creating objects and define other characteristics such as the behavior and security.

The three primary types of objects managed by the Content Engine are folders, documents, and custom objects. These pre-defined classes define the behavior for most business-related object types. Pages, templates, and other WCM entities managed in Content Engine are all classified as **document objects**.

In general, document objects:

- Have system properties that the system manages automatically, such as 'Date Created' etc.
- Can have custom properties for storing business-related metadata about the document
- Are secured with access control lists
- Can have content and index metadata, or metadata only
- Can point to content that is outside of the object store (external content)
- Can be versioned to maintain a history of the content over time
- Can be filed in folders
- Can have a lifecycle
- Can participate in business processes as workflow attachments
- Can generate server events when they are created, modified, or deleted which are used to customize behavior
- Can be renditioned to different formats, such as PDF and HTML
- Can be published to a Web site

Content Engine folders that store WCM Pages are called **WCM folders**. The WCM folder structure and its contents of pages and assets represent the structure of a WCM site. WCM folders are sub-classed from the base Content Engine folder class. They include two properties that define the behavior of new non-HTML pages: whether to convert the new page and what template to apply to the converted page. When the option 'Convert to HTML and assign template' is selected, a document such as a Word press release will be converted to HTML using the WCM Rendition Engine. Once converted to an HTML document, it will then be converted to a WCM document using the template defined for the folder. If the folder does not have a template defined, then the template of its parent folder will be used, and so forth until one is found.

Active Content

FileNet WCM takes advantage of FileNet P8's unique Active Content capability in which workflows are automatically triggered by content events. Data changes that occur in various application systems throughout the enterprise – for example, a new order is received – generate **events** that trigger actions in other applications via business integration middleware. FileNet P8 extends this normally data-centric event-action model to **content events**, generated whenever a piece of content is added to the repository, is modified, has its metadata modified, is approved, etc. Thus FileNet P8 content is *active* – it triggers actions automatically, according to pre-programmed policies and procedures, and tracks those actions to completion.

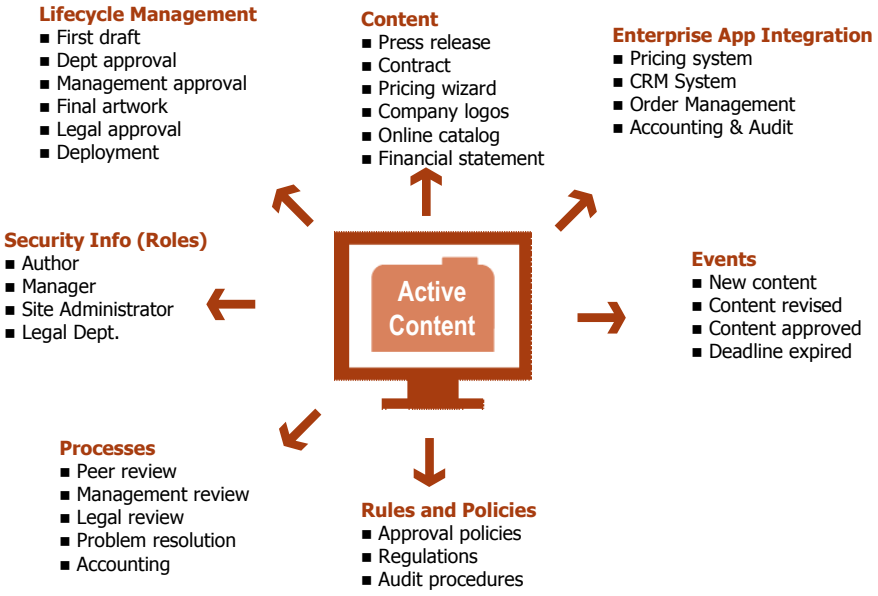


Figure 8. Active content automatically links content events to processes, lifecycle transitions, security actions, and external application integration

In a WCM context, Active Content means **faster time-to-Web** and consistent application of standard operating procedures. Consider the scenario in which a piece of business content, say a datasheet or press release, is created by a user in the marketing department (Figure 9). The standard operating procedure requires review and approval by a supervisor/manager and the legal department, followed by deployment to the Website. With Active Content, simply submitting the draft content to the repository generates an event that automatically triggers the review and approve workflow. The content contributor does not have to initiate the workflow manually. Then, when both Manager and Legal have changed the content status to Approved, another event is generated that triggers the render and deployment workflow. This could convert, render, and deploy the content automatically to the Website, or automatically begin the process in a more controlled release environment.

Active Content also gives FileNet WCM the benefits of loose coupling, allowing integration without modifying application code. For example, suppose two custom applications allow users to add documents to a repository. After the applications have been completed and deployed, a new requirement specifies that certain document types be recorded in an existing tracking database for legal review. Instead of requiring that both applications be updated to record the document in the tracking database, an event subscription is applied to the Content Engine that automatically records the documents with no change required to the custom submitting applications.

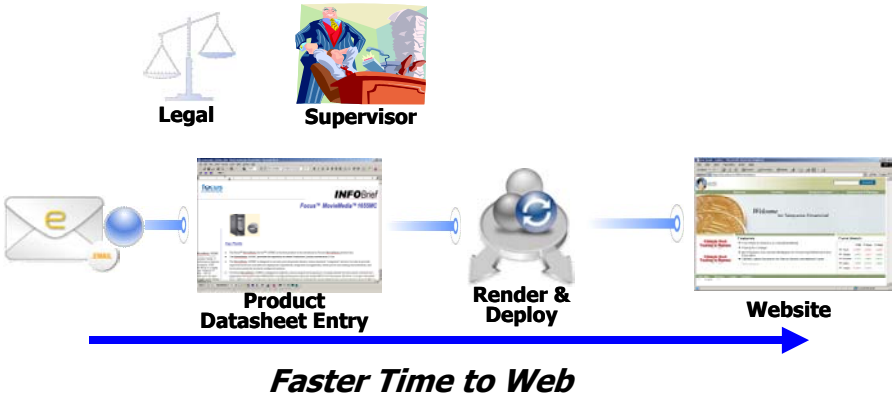


Figure 9. Active content means faster time to Web

Events and Subscriptions

The technical basis for Active Content is FileNet P8's publish/subscribe integration architecture. Each document, folder, or custom object in Content Engine automatically publishes events when an instance is created, updated, or other actions occur (Figure 10). FileNet P8 provides an event broker that allows a Process Engine workflow to subscribe to selected events, automatically triggering the specified action or process whenever the event occurs. Subscriptions can be associated with a class, so that the event applies to all objects in the class or subclass, or with individual objects.

FileNet P8 supports pre-defined event actions including launching a workflow, sending an Enterprise Application Integration message, or updating the security associated with an object. In addition, events are scriptable, meaning that custom script code, such as JavaScript, can perform any triggered action.

Trigger	Document	Folder	Custom Object	Others
Create	X	X	X	X
Update	X	X	X	X
Delete	X	X	X	X
Checkin	X			
Checkout	X			
Promote to a major version	X			
Demote to a minor version	X			
Classify complete	X			
Add containee		X		
Remove containee		X		

Figure 10. Events published by Content Engine Objects

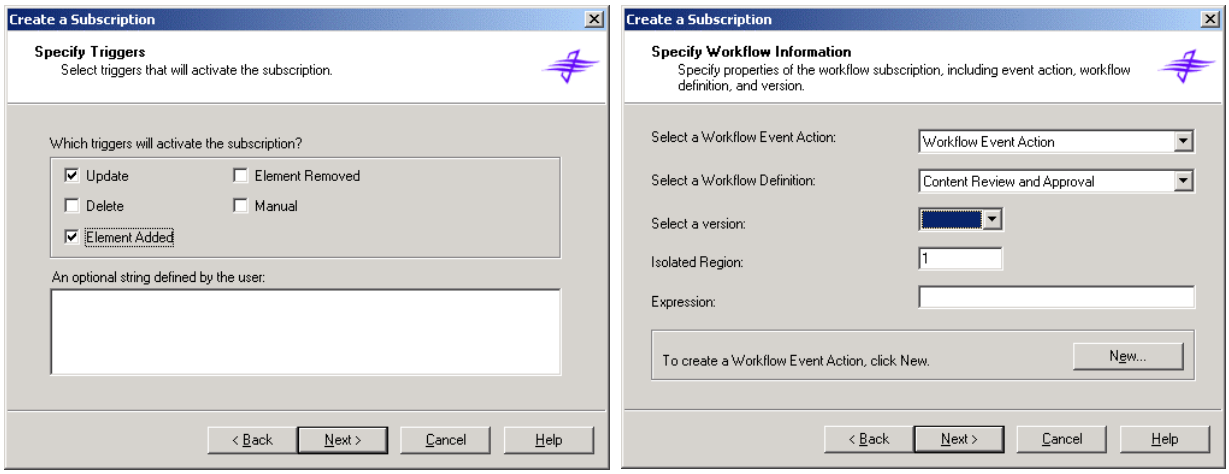


Figure 11. Event subscription wizard in FileNet P8 Workplace

This event/subscription model underlies WCM's out-of-the-box workflows for review, approval and deployment. Also, FileNet P8 Workplace provides a simple wizard for defining workflow subscriptions for user-selected content events (Figure 11).

Content Lifecycle

Another unique aspect of FileNet P8's Active Content model is the Content Lifecycle concept. Lifecycles allow administrators to define a sequential set of states that content will go through over its lifetime, and the actions that are triggered when it transitions from one state to another. Lifecycle transitions are thus another source of events that trigger an action or process. A user or application can "promote" or "demote" an object to move it forward and backward in its lifecycle.

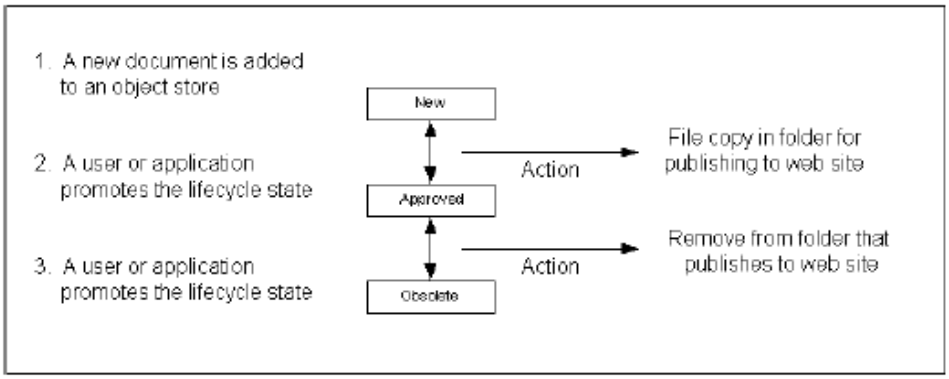


Figure 12. Content Lifecycle transition events trigger workflow actions

Figure 12 illustrates a simple lifecycle that files a document into a Web folder after it is approved and then removes it from the Web folder when the document enters the obsolete stage.

WCM Workflows

WCM Workflow is a set of specific procedures that automate the management, definition, contribution, approval, and deployment of Web content. It allows content contribution and management functions to be divided among a number of different user roles, such as writers, editors, and publishers, covering all steps of the process. Examples of tasks include: page creation, copy editing, graphic development, and placement of a page into a production environment. Workflow participants can be individuals or automated processes. Workflows can be event-triggered or manually launched.

WCM provides a very simple graphical workflow editor that is separate from the Process Designer offered with FileNet P8 Business Process Manager. Both WCM and BPM workflow templates are saved in the same XML-based modeling language and both run on the FileNet P8 Process Engine. WCM workflows can act on (e.g. approve) WCM Pages, assets, documents, and templates.

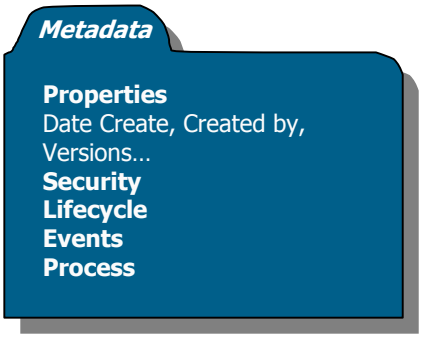
End-to-End Business Integration

Active Content events can be extended to trigger actions in external applications using EAI middleware. FileNet P8 provides out-of-the-box connectors to IBM Websphere InterChange Server. However, through FileNet P8's open design, Vitria and other business integration servers can be used . For example, the IBM connector converts a Content Engine event into an InterChange Server business object that can, for example, automatically update a customer data record in Siebel or generate an invoice in SAP, without human intervention. With FileNet P8, Web content management is naturally integrated with business processes spanning the enterprise.

Contributing Web Content

For most content contributors, submission of Web content just requires addition of metadata. WCM Entry Templates and Add Document Wizards simplify and automate the process by filing content into pre-specified folders and automatically populating most property values.

Metadata and Classification



Classification is the process of assigning metadata to content, specifically the selection of a document class and property values. In WCM, these metadata elements include system-generated properties (creation date, created by, version), security properties, lifecycle states, events, and workflow subscriptions. Classification can be performed by filing objects into folders that define classification taxonomies. Classification can be also performed by an end-user through the WCM application or Workplace, or automatically using FileNet P8's automatic XML classification capability.

In addition to wizard-based manual classification, FileNet Content Engine supports rule-based automatic classification of XML documents through mapping scripts that

associate XML tags in the incoming document to properties. It also allows custom auto-classification plug-ins to be built for any content type. Thus content entry into a Content Manager repository can be completely automated and event-driven. The submission of a content object is a standard event recognized by the Content Engine. The event and auto-classification information together can automatically trigger specific actions or processes including notification, format conversion, or deployment to the Website.

MS Office Entry Templates and Wizards

FileNet WCM integrates with Microsoft Office authoring applications like Word and PowerPoint to allow Entry Template selection directly from the application menu (Figure 13).

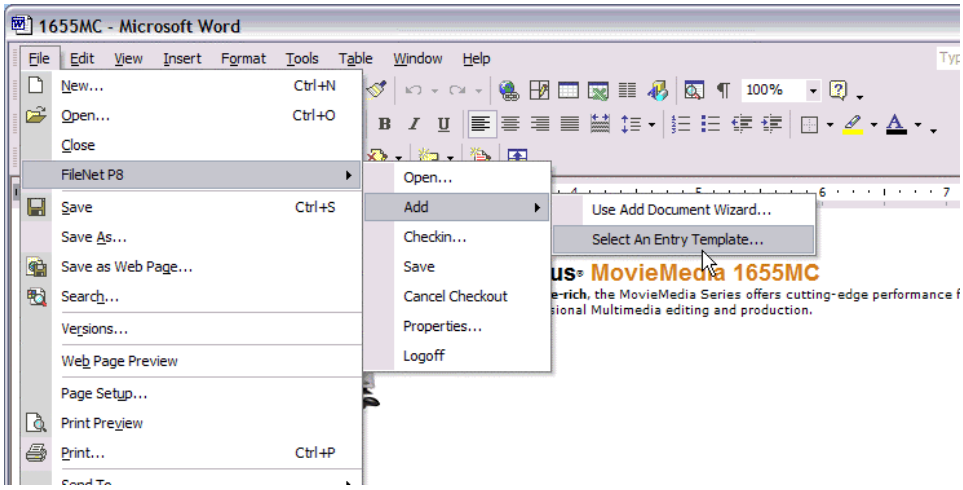


Figure 13. Direct content contribution from Microsoft Word

The Select An Entry Template wizard prompts users for the bare minimum, such as document title. The Entry Template then automatically selects a WCM folder, adds basic properties, and specifies Web conversion and deployment options, such as automatic deployment for each major version.

P8 Workplace Wizards

Content of any type can also be contributed from the FileNet P8 Workplace application (Figure 14). The user is led through a series of simple steps to select the folder and basic properties.

Figure 14. Submission of content from Workplace Add to Web wizard

WCM Page Editor Wizard

Alternatively, the WCM application (Figure 15) provides a wizard that allows contributors both to specify metadata and quickly build simple pages.

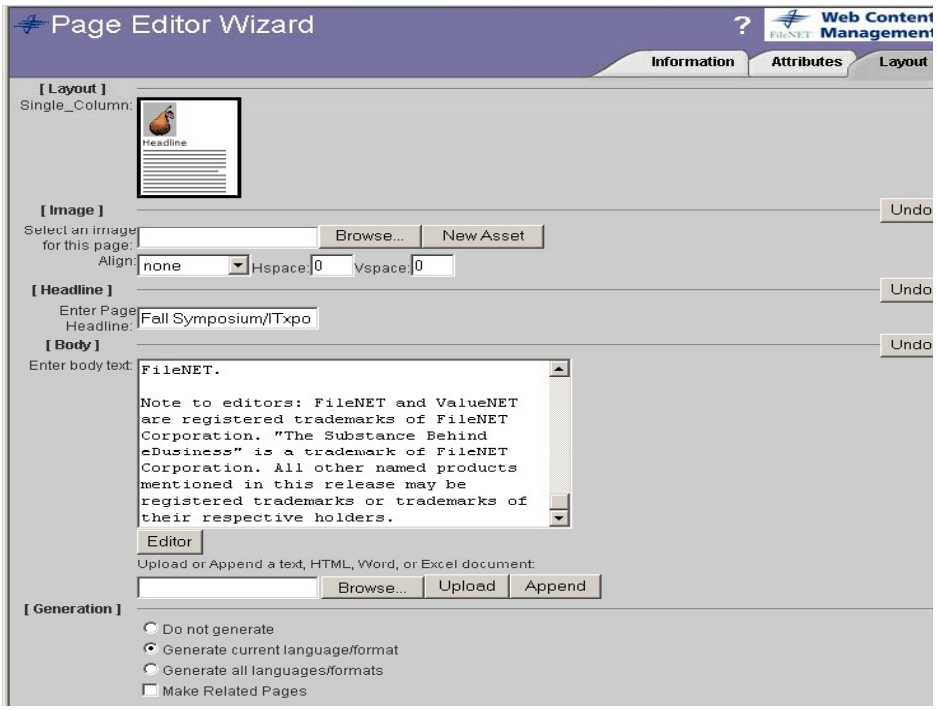


Figure 15. Submission or direct composition of Web content from WCM Page Editor wizard

The WCM Page Editor Wizard provides a browser-based, WYSIWYG interface that lets users compose Web content without needing to know HTML or manage links between components. FileNet also supports direct submission of Web content from third party page builders via WebDAV.

Managing Web Content

Once content is submitted, a review and approval process is typically required before the content can be deployed to the Website. FileNet WCM provides a suite of easy-to-use components that automate and track the processes of revision, review, and approval.

Versioning

WCM Pages, templates, assets and other Web content stored in FileNet P8 Content Engine are version-controlled using check-in/check-out locking to maintain an auditable history of all changes. Versioning can be enabled and disabled per document class, for cases when multiple versions are not required. A user can view all versions and a version can be frozen so that its custom properties cannot be changed. Also, content can be saved to the repository prior to checking it in, allowing multiple users to work on a checked out document while avoiding local user copies.

The Content Engine supports a two-level versioning scheme, where a component is saved as either a major or minor version. Minor versions are typically used to denote a component that is "in development," whereas a major version is typically used for content that is ready for deployment. The system can be configured to apply different access rights for major and minor versions, restricting access to content in development.

Page components, composite components, component reference values, and other WCM entities also are automatically versioned. When one of the components is versioned and contains a component reference, that reference gets saved with the version of the template, composite component, or page component. When a page is opened in the WCM editor, the page component, the component references for the page, and the local components referenced by the page's component references will be checked out. Any changes to the page's template will be saved as a new version of the template.

Rollback

WCM provides the capability to rollback to previous versions of assets, global text components, page components, composite components, and workflow definitions. The rollback action checks out the component, and checks in the version selected for rollback as the next version. The property values of the previous version are also retained but the security profile for the replaced version is not rolled forward.

Everything that is local to the component is included in the rollback. For instance if the template had a component reference that points to a text component, then the previous version of the component reference will be rolled back to the text component, but a page rendering with the template will get the latest version of the text component.

Search

Web pages stored in a WCM folder in a Content Engine object store can be searched using Verity's powerful K2 engine, included in the FileNet P8 platform. Key search features provided are:

- CONTENT AND PROPERTY SEARCH - Verity can be configured to index and search both the content and property values in a given object store. For example, a search for the text "Quarterly Results" will return all pages containing the search text either in the content or in a property such as the title.
- CROSS REPOSITORY SEARCH ACROSS MULTIPLE OBJECT STORES
- RELEVANCY RANKING – Search results can be ranked to indicate which results more closely match the search criteria. The ranking formula can provide a higher score based on the proximity of search terms.
- SEARCH TEMPLATES AND STORED SEARCHES – A Search Designer tool is provided in FileNet P8 Workplace to create, edit, and save stored searches and search templates.
- KEYWORD, PHRASE, AND FULL-TEXT SEARCH – Powerful text and phrase searching features include:
    - Inexact match (Soundex, stemming, typo, Thesaurus)
    - Any or All words
    - Case sensitivity or insensitivity
    - Exclude a word from the search
    - Search for words located near each other, in same sentence, or in same paragraph
    - Search within an HTML/XML tag
    - Complex Boolean combinations of search terms
- DOCUMENT SUMMARIES - Searches made through the FileNet P8 Workplace "My Search" page return document summaries within the search results.

Security and Access Control

FileNet WCM leverages FileNet P8's unified security model, including authentication, SSL encryption and session management, and authorization to perform specific WCM functions.

Even after a user is authenticated and logged on, all repositories and business objects are secured through Access Control Lists (ACLs). FileNet WCM's authorization model lists nine granular privilege levels that can be selectively granted to users or groups at the object level:

- Owner
- Promote Version
- Modify Content
- Modify Properties
- View Content
- View Properties

- Publish
- Deploy
- Archive

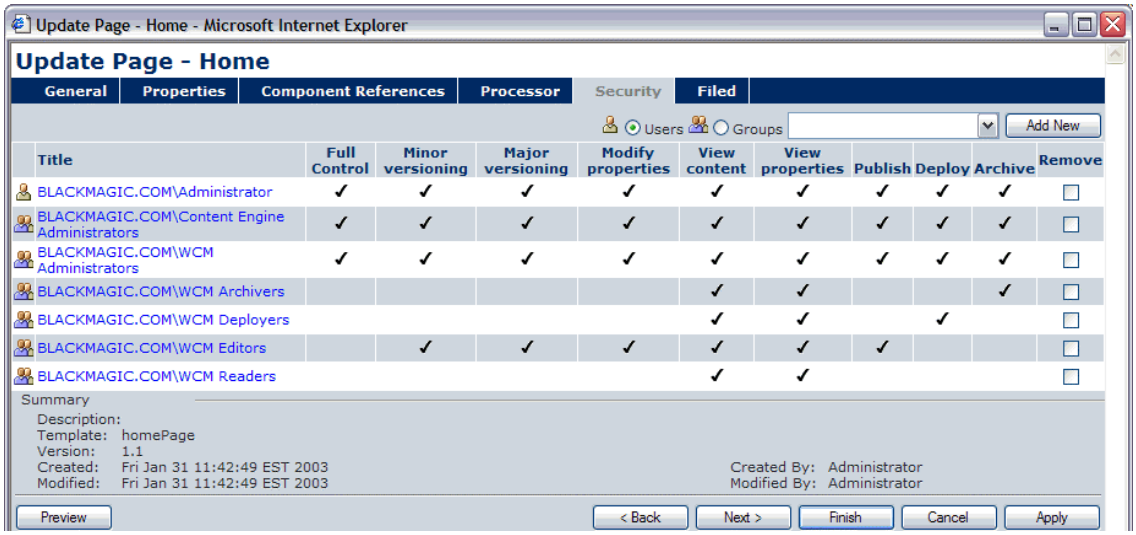


Figure 16. WCM offers granulart access control at the component level

Entry Templates automatically assign security, and security can be easily assigned across many pieces of content. Default security is assigned to each class, and security Inheritance applies to all child business objects.

Out-of-the-Box Workflow Tasks

WCM provides a set of out-of-the-box workflow tasks used in content review, revision, approval, and deployment processes. In Process Engine terminology, these are step processors, Web applications integrated with the workflow to perform Web-specific tasks. Examples include:

- Page create/modify
- Page preview
- Page verification
- Page properties
- Copy editing
- Page review
- Deployment
- Automatic deployment

These out-of-the-box functions, along with custom user-developed tasks, can be assembled into named workflows using WCM's graphical workflow editor (Figure 17). From FileNet P8 Workplace an administrator can then link these named workflows with specified content events using a simple wizard (Figure 18).

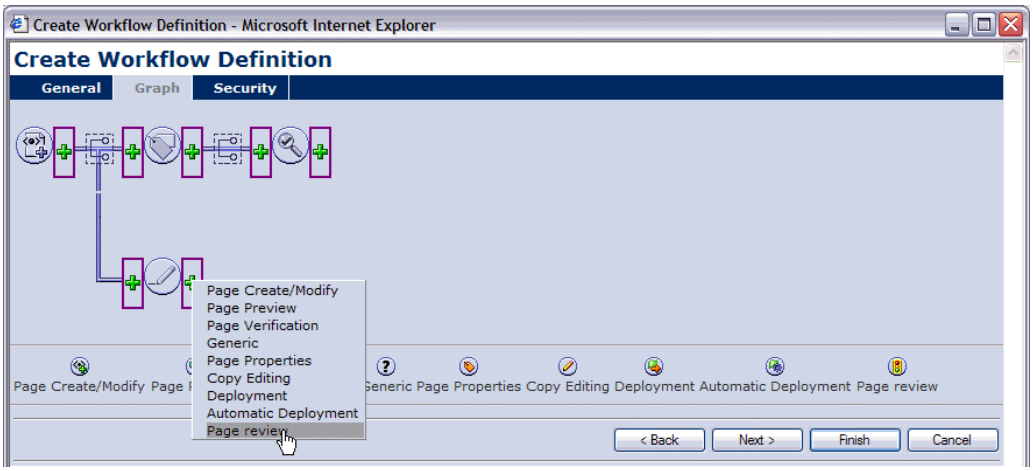


Figure 17. WCM graphical workflow editor includes 18 pre-built tasks

From Workplace, WCM provides facilities for workflow tracking and management. Managers can graphically see all workflows in progress, and can dynamically reassign workflow tasks. Workflows can be frozen and restarted or deleted outright. A workflow can even delegate one-time-only permission to a user to perform an action such as creating a page in the context of an assigned workflow task.

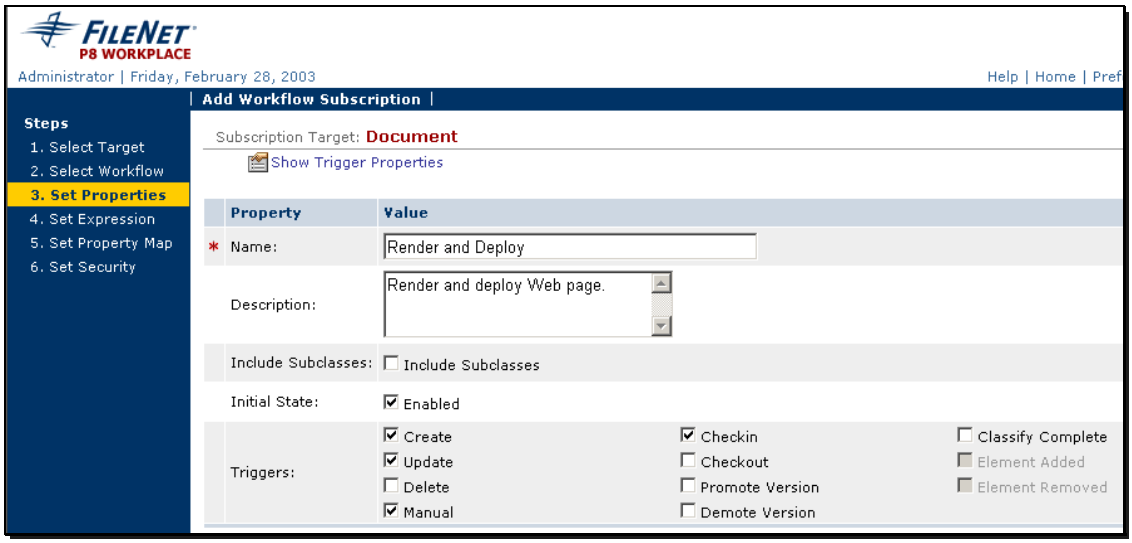


Figure 18. Workflow subscription wizard in FileNet P8 Workplace

Portal Integration

In order to let users throughout the organization perform occasional Web content management tasks as a routine part of daily work, exposing functionality through a portal interface has become increasingly important. An enterprise information portal is a user-configurable Web environment in which employees "live" and do routine daily work.

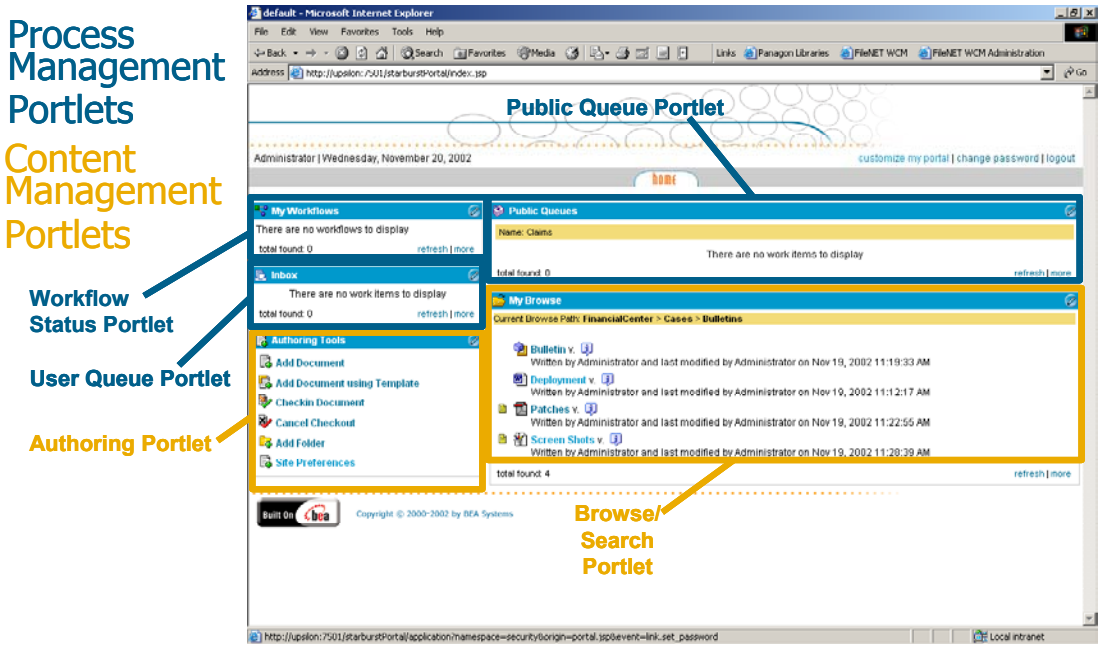


Figure 19. Web content management tasks exposed in a portal

FileNet P8 provides both Process Management and Content Management portlets for BEA WebLogic Portal Server and IBM Websphere Portal Server. These allow users to contribute content, review and approve content, and perform assigned workflow tasks (Figure 19).

FileNet WCM integrates directly with BEA WebLogic Portal through the FileNet WCM BEA Connector, allowing both content management from the portal and content deployment back to the portal. The FileNet WCM BEA Connector translates metadata between the schemas used by the FileNet and BEA environments, allowing FileNet WCM content to be managed within the portal. From BEA, FileNet WCM content producers can contribute or update information without having to program or rely on developers. When content is deployed from FileNet WCM, the connector will link to the BEA database and update the records that manage the location of the assets and the metadata associated to those assets.

This is illustrated in Figure 20:

1. Store. Content stored in CE is added and managed directly from the Portal.
2. Auto-update. Web content from CE is leveraged in WCM and is updated automatically at the next site generation.
3. Publish. Publish content updated through the portal to multiple environments, including the same portal from which it was updated, or deploy content as a complete file to a more “static” HTML Web environment

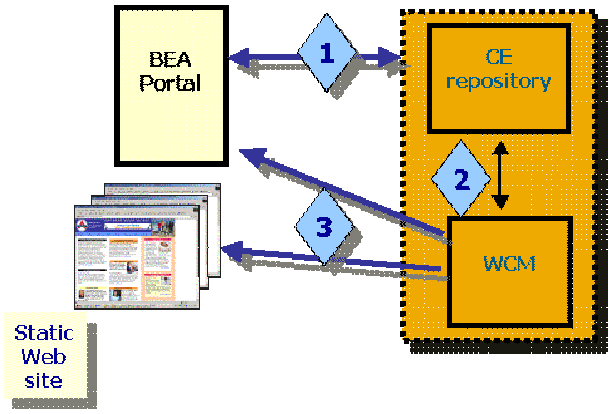


Figure 20. Portal integration architecture

Content Localization

WCM was designed with the needs of global organizations in mind. All components are stored in UNICODE. Web Content Manager can be installed and function correctly in non-English environments. Web Content Manager supports extended character handling, date/time & currency formats for Europe, Asia Pacific & the Americas. All content and metadata have full single-byte and double byte-encoding support, and all interfaces are localizable into any single-byte and double-byte language. User interface text is provided in different language packs.

Building and Managing Websites

Perhaps the most important function of Web content management is ensuring consistency, timeliness, and accuracy of information across all pages in the site. FileNet WCM provides comprehensive tools for Webmasters, site administrators, and creative designers to design the templates used by content contributors, and manage the components shared across the site.

Building Templates and Page Layouts

Webmasters and creative designers typically build the templates and page layouts used across the site. A layout is a template for a composite component representing the variable content on a page. The overall page template typically specifies fixed information such as header, footer, and navigation elements.

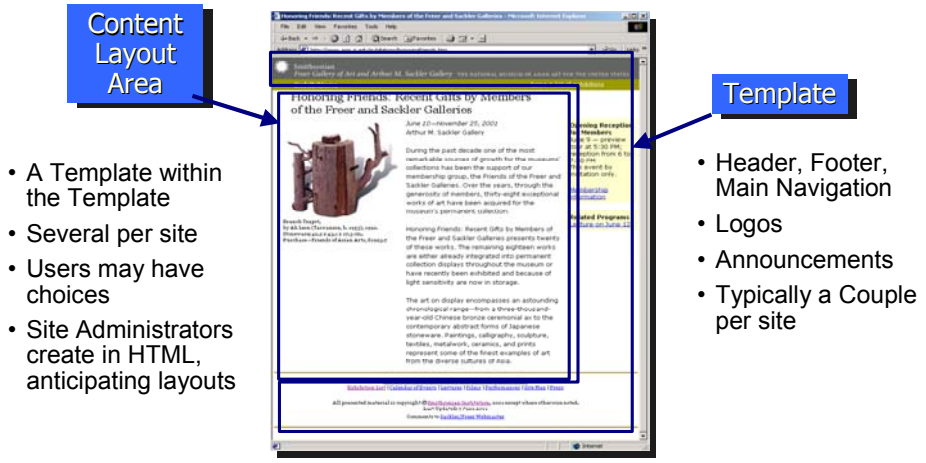


Figure 21. Page templates vs content layouts (composite component templates)

Templates and layouts are usually created using popular third party tools supporting the template format, e.g. Dreamweaver for HTML. Dreamweaver templates can be imported into WCM and then "componentized" by replacing fixed elements in the template with WCM component references. Layout definition in WCM is provided using the WCM Page Wizard (Figure 22).

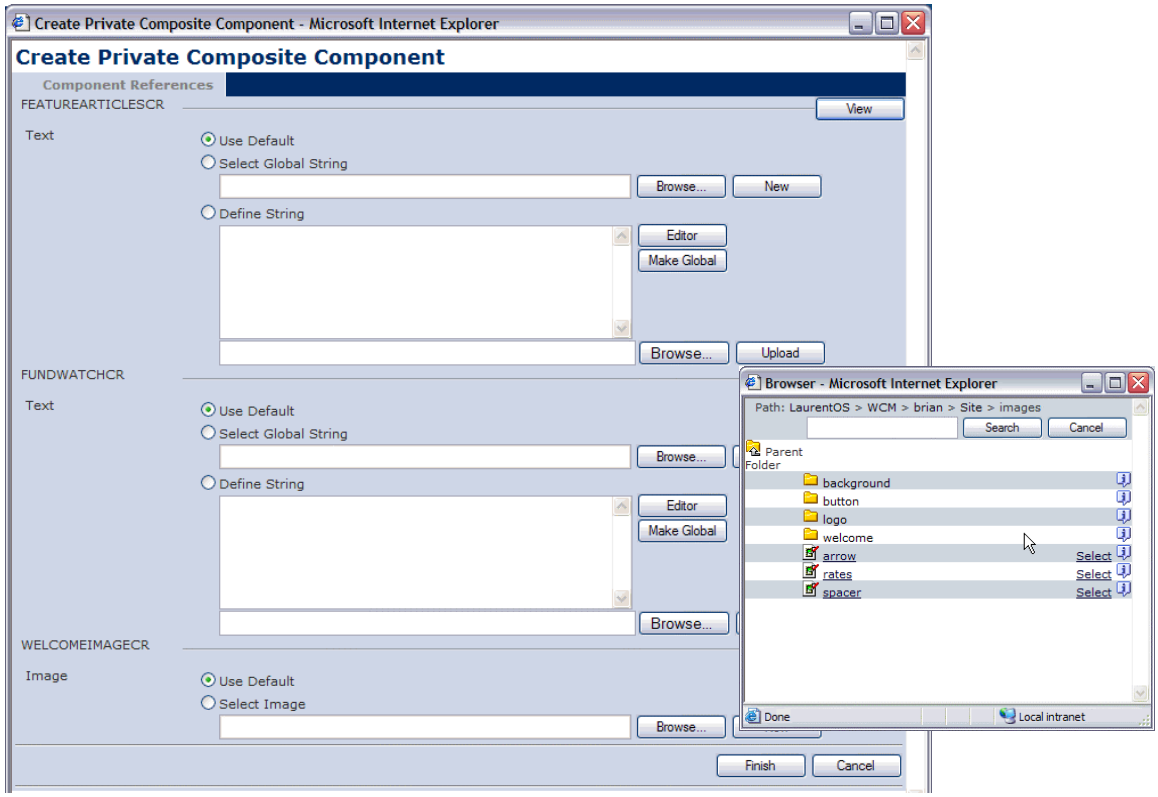


Figure 22. Layout definition using WCM Page Editor Wizard

WCM Control Center

WCM Components are managed in the browser-based WCM Control Center application. **Control Center** (Figure 23) includes a set of panels through which administrators can view all files and folders for a site and manage the components, templates, and component references.

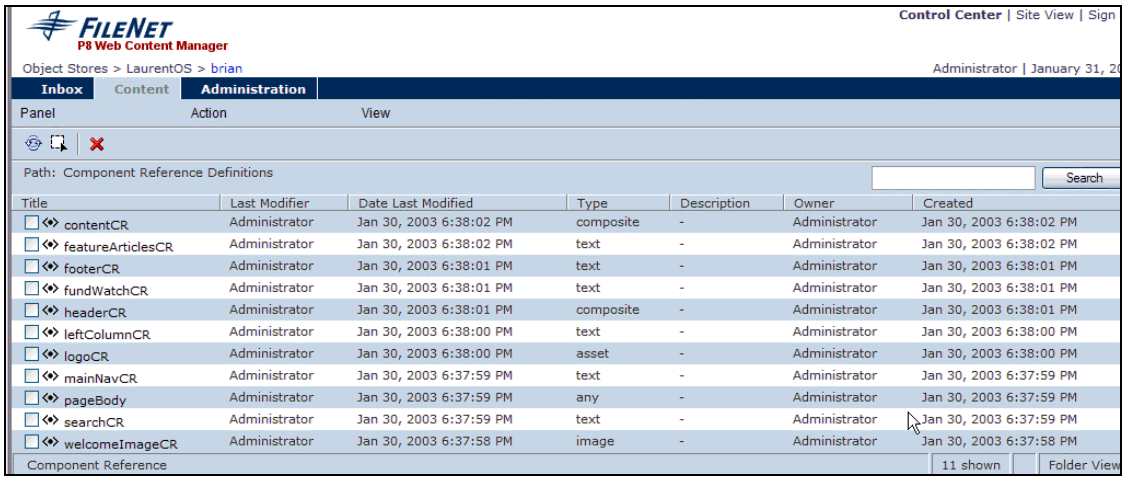


Figure 23. WCM Control Center, Component Reference Definitions Panel

Deploying Web Content

Deployment refers to the transfer of Web pages and assets from the development environment to a target test or production Website environment. FileNet WCM offers versatile, highly configurable deployment, with guaranteed referential integrity – no broken links – across the site. Content can be deployed to a filesystem, database, application server, or portal target environment with efficiency, security, and transactional rollback. Also, like the rest of FileNet WCM, deployment is easy to use, featuring graphical configuration wizards (Figure 24) and integration with Active Content workflow.

Figure 24. WCM Administration Deployment Wizard

Referential Integrity

One of the unique advantages of FileNet WCM's component approach is Referential Integrity. This means that when deploying a Web page, any **related pages** – pages and assets that the page has a link to – will exist in the target after deployment, i.e. the

deployed site has no broken links. In the rendering process, if a link to a page or asset is found, FileNet WCM checks whether it exists in the deployment target, and if not adds it to the list of pages or assets to be deployed. Any pages or assets in the original source component list will always be deployed.

Just as important as deploying content is undeploying content. Referential Integrity tracks where each component is used across the entire site. So when it comes time to undeploy content, all instances where that piece of content is used will automatically get expired from the entire site along with any associated bread crumbs and links.

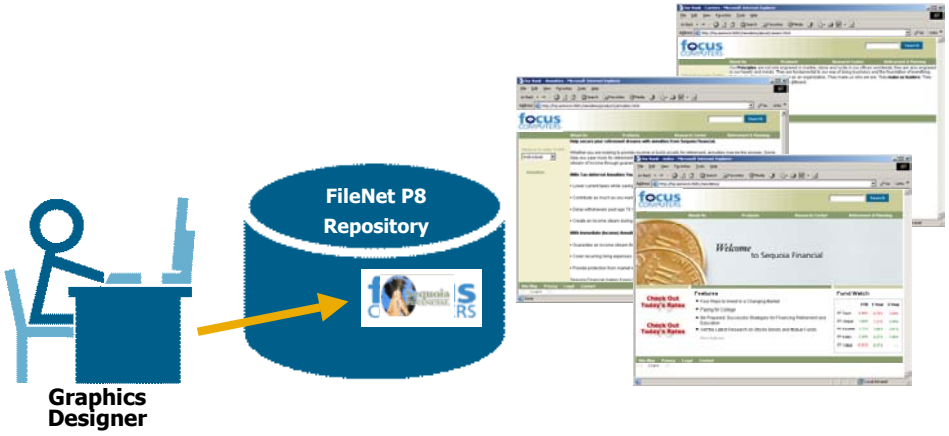


Figure 25. Referential Integrity assures that shared components are updated wherever used on the site, transparent to the content contributor. Example: Update corporate logo once, change propagates throughout entire site.

Page Assembly and Preview

Web content is rendered and assembled from WCM components when it is deployed. The Deployment Service invokes the Render Service to assemble Web-viewable pages from the most recent approved version of each component, calculating and inserting the proper URL links for the selected target environment.

Preview refers to rendering and viewing within the development environment, essentially deploying to a built-in "internal" target environment. WCM provides the following built-in target environments for preview:

1. **Preview**. Users can preview a Web site within the WCM environment.. Any links contained in the preview content lead to another preview document.
2. **Composite View** (Edit Mode). Composite view works the same way as preview, except that a visible border wrapped around each component allows the user to selectively modify the global, template, or document value of the component (Figure 26).

Figure 26. WCM Control Center Component View

3. **Local File System**. The local file system deployment environment is configured with a Web server, which enables the users to view, create and modify the documents without the need to access the WCM Administration panel. It is essentially a snapshot of the rendered documents.
4. **Content Engine Object Store**. Rendered pages can also be stored back to the Content Engine, enabling the site to be viewed and managed from Workplace and other FileNet P8 applications.

Dynamic Content Preview

Dynamic content preview allows users inside WCM to view the rendered output of JSP, ASP or any Web scripting language inside the WCM editing environment. Dynamic preview deploys the content to an application server, such as WebLogic or Websphere, using workflows transparent to the user. The dynamic content scripts run inside the app server environment and are accessible through the previewing functions (Preview and Composite View) in the WCM Site Panel.

Deployment

The FileNet WCM Deployment Service also moves content from the development environment into a target application designed for content delivery. FileNet WCM

features flexible deployment to a file system, database or application server (Figure 27). Any WCM object can be deployed to any database schema.

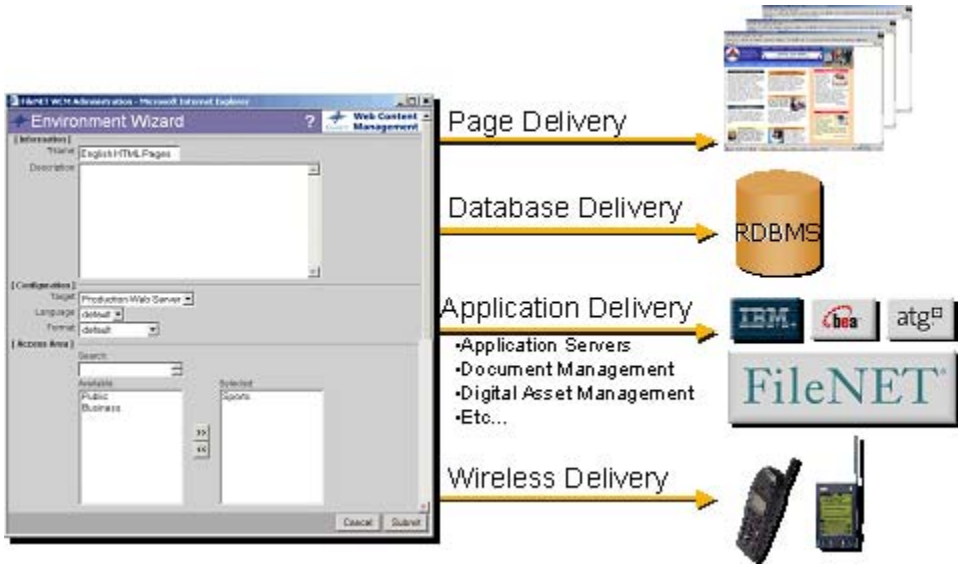


Figure 27. WCM provides flexible wizard-based deployment to filesystems, databases, or application servers

Deployment supports both file transfer and database update mechanisms with security and transactional rollback. Database deployment has the additional functionality of performing field level translations of the content and referential integrity.

WCM knows which components have changed, and automatically renders and deploys the latest version of each changed component. To assure referential integrity, WCM checks all related pages, but for efficiency only deploys content that has changed.

FileNet WCM allows content to be undeployed as well, either manually or under workflow control. Content is purged from all target environments, even database tables, when content is undeployed, expired, or deleted.

Key Capabilities of FileNet Web Content Manager

FileNet WCM not only delivers the comprehensive functionality needed for building and maintaining complex Websites, but provides several key Web content management capabilities:

1. **Comprehensive content management.** FileNet not only manages content in Web formats like HTML and GIF, but source document formats like Word or PDF, rich media assets, and scanned document images. As part of the FileNet P8 ECM platform, WCM provides a full suite of cataloguing, classification, version control, access control, workflow, and format conversion services for any object in a Content Engine object store, including XML objects. Through the

Image Services Resource Adapter, WCM has access to scanned documents in FileNet P8 Image Manager as well. In addition, WCM supports a virtual content management framework for content objects stored in external repositories.

2. **Advanced component architecture.** Instead of managing Web content at the page level, WCM manages a comprehensive framework of sub-page components that can be reused across the site to provide consistency and accuracy. Components provide granular control of Web content, while significantly decreasing the site maintenance effort and increasing the value of the content.

3. **Referential integrity.** FileNet WCM's referential integrity assures that all pages and assets referenced by a WCM page are deployed in the selected target environment whenever the WCM page is deployed. Thus assures the deployed content has no broken links, and allows component changes to be propagated easily and securely wherever that component is used.

4. **Event-driven Active Content.** WCM content generates events, turning it into Active Content. FileNet P8 links Active Content events with subscribing actions, so that additions, updates, approvals, or lifecycle transitions of Web content automatically trigger workflows that speed time to Web. Moreover, the FileNet P8 event-driven architecture lets Active Content drive agile business processes across the enterprise through FileNet BPM and EAI connectors.

5. **Ease of use.** FileNet WCM includes a suite of wizard-driven applications that make contribution and maintenance of Web content fast and easy. Users across the organization can become Web content contributors, reviewers, and even page designers without special training or knowledge.

6. **Flexible deployment**. WCM content can be deployed to filesystems, databases, application servers, and portal servers through a simple wizard interface. WCM renders pages and computes links as needed by the selected target environment, and guarantees referential integrity of the deployed site version.

7. **Advanced J2EE architecture**. FileNet WCM is a J2EE application, with key services implemented as EJBs. That allows it to leverage the exceptional performance, scalability, availability, and integration features of the J2EE architecture, and conform to the platform standards demanded by today's IT organizations.

About FileNet

FileNet Corporation (NASDAQ: FILE) helps organizations make better decisions by managing the content and processes that drive their business. FileNet's ECM solutions allow customers to build and sustain competitive advantage by managing content throughout their organization, automating and streamlining their business processes, and providing the full-spectrum of connectivity needed to simplify their critical and everyday decision-making.

Since our founding in 1982, more than 3,700 organizations, including 80 of the Fortune 100, have come to depend on FileNet solutions for help in managing their mission-critical content and processes.

Headquartered in Costa Mesa, California, FileNet markets its innovative solutions in more than 90 countries through its own global sales, professional services and support organizations, as well as through its ValueNet® Partner network of system integrators, value-added resellers, and application developers.